FOCUS

OA: STILL A CLOUDED ISSUE

DEPARTMENTAL
COMPUTING

MARKET
ANALYSIS

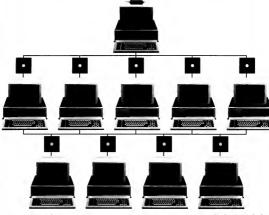INFO CENTER
STRATEGIES

MICRO/MAINFRAME
MYTHS

COST-JUSTIFYING
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DEPARTMENTS

WHATEVER YOUR NETWORKING NEEDS,

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Maybe it's simply linking all the personal computers in one department so they can share information.

Or perhaps it's giving a PC in sales access to the mainframe in accounting.

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VIEWPOINT

By Any Other Name

We have become victims of the instant gratification syndrome. If it doesn't happen immediately, we lose interest and consider it a failure.

Five years ago, office automation was the hottest technology around. Everyone was talking about OA, but few if any companies were doing anything beyond the very initial steps of word processing. Today, few people want to talk about it, but almost everyone is doing something and is impatient to expand the number and types of applications as well as the user population.

The term itself, "office automation," is what has fallen out of favor. Everyone has his own definition of office automation, and almost no one seems to be willing to admit that what he is doing is, in fact, under this umbrella term. The concept has become at best confused and misunderstood and at worst a real detriment to the introduction of applications and technology to the workplace. "Office systems" and "information systems" are common cover-up terms for office automation. The term "end-user computing" is often substituted for what used to be under the nomenclature of OA.

But just because the term office automation may be on the way out, don't be fooled into thinking that the technology is. The focus has changed from conceptual, trendy terminology to specific applications. These applications have become centered on departments or work groups, and the demand for them is continuing and escalating.

Conferences, too, are reflecting this trend of moving from the general to the specific. These meetings are becoming smaller and more topical — relating to one technology such as artificial intelligence rather than to a generalized slate of topics. Even the 7-year-old Office Automation Conference sponsored by the American Federation of Information Processing Societies, Inc. has called it quits due to, for the most part, a lack of interest by both vendors and attendees.

Organizations are stepping back to determine how the landscape of products they have purchased in the last few years are being used. Many are finding the equipment (mostly personal computers) is being underutilized, and top management wants to find out the reasons for this before any more purchases are made. While valid reasons may exist, such as lack of new and more innovative software and the very real and continuing problem of incompatibility, this doesn't mean that these applications will not grow and expand.

As by-product of the age of television, we keep flicking the remote control device to catch the show on the next station. We can also switch from one term to another, but in the end we need to realize that no matter what we call it, we are still talking about the same set of applications and technologies.

Jan Dooley

Hitting The Books

I was recently involved in putting on a computer conference that offered a wide assortment of quality seminars, laboratories and demonstrations. There were interesting vendors and a format that encouraged exchange and interaction. There was only one small problem. Despite extensive promotion, few people attended.

I was astonished. Only a few years ago, keeping up with one's profession was an industry obsession. Trade shows were packed with people hungry to keep pace with technological advancement. No one wanted to commit professional suicide by becoming technically obsolete.

Today I see fewer manager opportunities. Trade shows report disappointing turnouts, and professional societies are affected by the same malaise. The trend in professional education is clearly downward and shows no signs of resuscitation.

As a data processing professional, I am warmed. If we are to continue to call ourselves a profession, we have to remain knowledgeable about the state of technology and how it can assist our organizations. We have to know how to manage and deploy the company DP resource. If our companies entrust us to keep up our skills and knowledge in these areas, why aren't we doing it? Is it that this well-defined, exclusive role is disappearing and new technology is making our skills disbursed and generic? Is this what is directly suppressing our drive for professional education?

Because this trend constitutes such a fundamental danger sign, I asked many DP managers what was happening and discovered the following series of excuses that need rebuttal:

• "We can't afford the time." Although the DP staff is typically harried these days, education is not recreation but an investment for the future. Not taking the time is tantamount to "eating the seed corn."

• "We can't afford the costs." The economy is too convenient an alibi. Remember, without developmental training you face the unavoidable costs of turnover, on-the-job training, cost of errors and, certainly, the high cost of lost opportunities.

• "We have in-house education." This usually means in-house training. If this is all you have, then you hazard the possibility of becoming inbred. Every environment needs some way to infuse new ideas, examine alternatives and evaluate solutions for the future.

• "We hire people already trained." Soldiers of fortune have fickle loyalties and a limited useful life. Interestingly, professionals usually migrate to environments where they can learn. If you do not provide that opportunity, your most valuable employees will be those most recently lured. By thus inviting your senior people to leave, you are giving your department the appearance or a revolving door.

• "Training is no longer necessary." I have talked to managers who say technology today is stable with little new to learn. They must also believe the earth is flat and babies are delivered by storks.

• "Educational offerings today are no good." Formal classroom techniques must give way to observation, questioning, gleaning kernels of knowledge from mountains of chaff. If you expect predigested encapsulations, you will always be disappointed.

• "My company won't let me." This is a seemingly unchallengeable obstacle. Hard times mean hard measures that DP as part of the management team must support. However, all too often we fail to lobby for the importance of education. It is our responsibility to apprise management of the risk of deferring professional education and convince it not to look at education as an expense but as a valuable and wise investment.

Much has happened in our profession: crises in confidence, dilution of responsibilities, spending restrictions and stagnation in job mobility. The temptation is to react by timidly entrenching in a turtle-like fashion. But professional paralysis is neither smart nor responsible. To serve our companies better and continue to be personally sharp, we must be aggressive about our need for education and aggressive about obtaining it. I ask you to analyze the status of your education program and not to let excuses get in the way of this challenge.

Young is principal and the director of consulting for Arthur Young & Co., Worcester, Mass. He has worked in the industry for 15 years.

VIEWPOINT

MIS Continues Rise Through Corporate Ranks

Q&A
Leon Jackson

Leon Jackson is a unit manager and heads the Office Information Practice at Arthur D. Little, Inc., a consulting and market research company located in Cambridge, Mass. Jackson has helped complete a new survey of Fortune 300 MIS managers dealing with integrated office systems. Jackson shared some of these findings with Computerworld Focus.

What do you think is one of the most important findings from the survey?

One of the most important developments we've noticed is the percentage of managers in office systems, telecommunications and MIS who are now reporting directly to the same high-level MIS executive. Fully 81% of the companies surveyed had these managers reporting to the same executive, up from 78% last year in a similar report. Breaking down industry categories, 86% of manufacturing companies surveyed had this arrangement, compared with only 60% of utility companies, mainly, I think, because utilities retain a more conservative

or structured arrangement with their information resources. In between were the financial services companies, 77% of which reported to the same executive.

How does MIS fit into these findings?

That's interesting. Of all the companies surveyed, 58% said the executive to whom all these divisions report is from MIS. In 60% of the cases, the companies simply took the office systems and telecommunications functions and moved them under MIS. They didn't change MIS, and they didn't change the organization, but they changed the reporting structure. I think this strengthens the

theory that MIS is becoming more involved in office decisions, and it's changing the way office systems vendors approach their marketing. Products that emphasize compatibility with mainframes and are backed by a major vendor will have more weight now in offices and with MIS than a few years ago.

Is the increased set of responsibilities going to put a strain on MIS?

In most cases they will still be retaining an office automation person who will be responsible for office systems and who now reports to MIS instead of someone in the administration department. MIS will have to delegate more responsibility, however.

What else have you found about MIS from the survey?

There is one other major change occurring with MIS. More companies are creating positions under the general title of chief information officer, and these people are in charge of overall corporate information strategies. To date, these positions came with a common philosophy that said that the person who runs all the corporate information management should be more of a businessman than a technocrat, able to understand the value of information and its management within the company from a competitive, strategic as well as operational point of view.

Conversely, although the MIS manager is very good at handling the operational side, he has not necessarily been trained to understand the way that information management can be used for competitive and strategic reasons. The tendency, then, has been to take people from the financial side who understand data processing but are not technocrats, make them chief information officers and have all the others — including MIS — report to them. It's called information resource management, a new buzzword. Although 58% of the companies surveyed have the data processing, office systems and telecommunications functions reporting to MIS, another 21% now have their functions reporting directly to a chief information officer.

What we've found, however, is that a lot of those information officers are now being promoted from the ranks of MIS, not the financial side. That tells us that corporations are placing more stress on computing functions, in many cases equating it in value with corporate financial resources.

Departmental computing seems to be a big concern with many corporations now. Did you touch upon that in your survey?

We asked the companies to rate the obstacles they thought were blocking the way to implementing departmental systems. The inability to distribute data bases properly among departments was listed by [more than] 52% of the respondents as a major obstacle.

Departmental computing in theory involves the sharing of disk storage, peripherals and communications among workstations. Also, to make departmental computing really effective, you need some sort of data base capabilities as well

VIEWPOINT

Slugging It Out Under The OA Umbrella

INSIDER
By Timothy J. Caffrey

Schizophrenia, not products, stole the show at the March Office Automation Conference in Dallas. Political infighting and semantic tussles produced a decision to call it quits for the once-thriving show. At the heart of the decision lay a growing perception that the term office automation had outlived its usefulness and no longer described a real market or planning agenda.

OA is paying the price of its success. It has been so successful as a diving force in information systems marketing and planning that it now describes a range of markets and issues that is perhaps too big for one conference or appellation to convey adequately. Evidence of that expansion is found in the range of hardware, software and acquisition issues slugging it out under the OA umbrella.

In the area of hardware, OA has expanded from stand-alone word processors to a range of competing options. Networked PCs, multiuser micros and proprietary minis all vie for the position of OA delivery vehicle. In fact, the battle over departmental systems is one of the hottest in the industry today.

Consider, too, the issue of applications. Today, OA is in a real sense applications independent. The increasingly compelling price/performance of personal and departmental computers has instilled a new willingness to move applications off the mainframe. Downsized applications are being merged with personal and departmental applications to create a broad portfolio of OA applications. Momentum to download applications develops ment is also building. As a result, OA is distorting the traditional top-down systems development perspective.

The shift in hardware and software is accompanied by a shift in demand psychology. Justification arguments now focus on departmental and group outputs rather than the concept of personal productivity. Where individual productivity has been measured in pages per minute or quality of presentation, group productivity can be measured in terms of bottom-line dollars.

Demand for OA systems continues unabated, but the moniker itself wallows in semantic muck. The major complaint is that the term still evokes archaic attachments to word processors and dictation equipment.

There is an informal hunt for a new banner for the OA phenomenon. The new name must meet two conditions. For vendors, it must convey a reason for

buying systems. OA is such a reason. For buyers, it must reflect real job responsibilities, budgetary authority and planning objectives.

Early tallies indicate that the term "end-user computing" is the leading contender. End-user computing, of course, distinguishes those systems designed to serve end-user needs from those designed to compute for the sake of computation. In a more serious vein, the term redefines and challenges the traditional control of computing systems. OA fell too readily under the control of MIS and DP power structures. End-user computing hints at a decentralized, democratized power structure.

As the definition of OA expands, the search for a new name will intensify. The clear winner is uncertain. We can imagine a keynote address at some future forum where the topic runs the gamut from local nets to end-user computing to business systems planning to decentralization and downsizing to departmental systems and power politics. A listener asks, "What's she talking about?" The whispered response: "OA."

Caffrey is director, strategies for micros and office systems, for International Data Corp. in Framingham, Mass.

VIEWPOINT

Up, Up And OA

ISSUES AND ANSWERS
By Robert D. Gilpes

Companies are reexamining their office automation plans and reevaluating their objectives. In doing so, a new set of criteria should be used to weigh the final decision regarding office automation. The impetus should be toward office information systems whose emphasis is on "information." Above all, OA should be viewed as a single phase in the evolution of advanced office systems.

It was the personal computer that focused office systems on information processing. The personal computer could process information in various forms — text, data, image and voice — but more importantly, it provided "personal" processing, a factor missing in earlier office systems.

The personal computer is evolving as the key element in office worker productivity. Individual information processing has become the driving force in the office system architecture. In light of this, new issues have to be examined.

Office automation and cost justification seem to have been in opposite camps since the inception of the office automation concept. The driving force in the justification analysis has been the price of productivity.

A new set of criteria needs to be established that weighs evenly with productivity and cost. Understanding the value of product quality from both a creator's and recipient's perception becomes an ever-increasing factor in the analysis.

The quality factor extends beyond the product level to the work environment. Office systems invariably impact the workplace. The quality of work life becomes a familiar issue as office technology expands to every facet of the office.

The office worker is now equipped with advanced tools that will improve work life by eliminating tedious tasks while allowing for creativity and productivity. This is a subjective factor. Yet this factor may identify problems that previously the work environment has been enhanced by automation, if productivity remains low and costs remain high, one might reexamine the technology that was implemented.

Therefore, the set of criteria used to cost-justify office systems is at issue. The approach of work measurement will ultimately not provide the total analysis.

Similarly, the focused application of technology to expensive or inefficient tasks may show time improvements may be inaccurate without expanding the analysis to include some subjective factors. To save time by automating but to do so at the expense of quality does not mean having saved very much.

Office system designs may be developed by reviewing the office system from an individual's perspective, with the understanding of information processing's role in the office system more refined, if not simplified. The frequency of information access will be the determining factor, not the need to integrate or interface the whole office system puzzle.

The concept of office automation has changed. The term and its meaning change daily. Emphasis is being placed more on information and its quality rather than on pure automation. Therefore, a redefinition of OA should be a continuous subject, if only to prepare for the next milestone.

Gilpes is partner in charge, Information Systems Services Consulting Practice, at Peat Marwick, Mitchell & Co. in New York. This article was written in conjunction with Michael Blum, a senior manager in the Information Systems Services Practice at Peat Marwick's New York office.

VIEWPOINT

Big Blue Struggles To Define Office Automation Plan

BLUE BEAT
By Dale Kutnick

IBM's office automation strategy in 1985 and 1986 continues to revolve around "office anarchy" — Personal Computers, incompatible systems and far-reaching statements of direction. IBM's current and near-term efforts are focused primarily on acquiring real estate at the user desktop and departmental level via the PC family, the 4300 and System 36 and 38 and enveloping them in a larger corporate network — Systems Network Architecture (SNA) and LU 6.2 based, of course — that enables the MIS department increasingly to take control.

This tactical maneuver is a necessary holding action in the face of increasing competition from Digital Equipment Corp., Wang Laboratories, Inc., Data General Corp. and other minicomputer vendors that offer more complete, more scalable OA solutions via software (DEC's All-In-1, Wang's Office and DG's Comprehensive Electronic Office) and hardware (compatible minis from 0.5 million instructions per second [MIPS] to more than 3 MIPS). These vendors also offer IBM PC and SNA connectivity to

lure IBM customers who are not true Blue and are demanding departmental processing. IBM's primary solution — the System 36 — offers less integrated OA software (Personal Services), has no local-area network connection (IBM Token-Ring connection won't be available until year-end 1986) and is not upwardly scalable (users must convert different, much more expensive systems like the System 38 or 4300). The 36 is a good departmental server for communications and files but a limited departmental processor, relative to its major competitors.

This situation has put IBM into a quandary because the firm's strategy revolves around creating an infrastructure

of sophisticated systems and architectures — physical, logical and applications layers within a single environment — that is not yet fully developed.

The bottom line is that IBM will provide a wide variety of physical devices and systems logically interconnected through various local networks and SNA across office environments. This logical layer is currently supported in a series of subarchitectures and protocols that provide the information delivery systems that will enable applications to be linked across disparate systems. The logical layer is therefore the most strategic of the three layers because it provides the underlying architectural infrastructure that supports not only the other layers but the many changes that will occur within them such as new PCs, minis, software programs and so on.

This logical layer will enable IBM to unify its various mid-range, departmental and desktop systems notwithstanding their different operating systems) not only through networking but ultimately via common facilities, end-user interfaces and applications. This will enable users to execute processes across systems, regardless of their origin.

Despite these grand plans, IBM has still done little to implement a coherent, integrated office automation strategy and is unlikely to do so for at least another 12 to 18 months. Clearly, IBM must resolve overlaps and incompatibilities between its VM-based Professional Office System (Profs) world and its MVS- or VSE-based Personal Services- Distributed Office Support Systems (Disoss) office environments. Ultimately, the functional distinctions will disappear, and Profs and Personal Services will coexist comfortably in different application niches — with both being able to take full advantage of Disoss and Systems Network Architecture Distributed Services.

But Disoss itself requires some significant changes before it will be a successful product. There are currently fewer than 1,000 Disoss sites worldwide, and users are resisting the product. Users say the application program interface is complex and requires many hours of system programmer setup. The user interface is cumbersome; recovery from failures is tenuous at best and it is a resource hog. These problems alone will take IBM the better part of 1986 to clean up, and while Disoss will eventually take its place "inside SNA" in most large IBM customers' facilities, many users are widely delaying its implementation.

IBM's office automation strategy is slowly becoming clearer — logical and cooperative processing between different systems — but its implementation efforts are still shrouded in tactical solutions. Refining the software and underlying architectures to integrate its office systems fully will require the remainder of the decade. And many acceptable, interim solutions will emerge during the next three years. Concomitantly, a number of minicomputer vendors will leapfrog IBM and offer their users better office systems solutions that can later be linked into IBM's grand scheme. These alternatives will help drive the OA market and the OP/communications industry in general.

Kutnick is executive vice-president of research at the Gartner Group, Inc., headquartered in Stamford, Conn.

NEWS

Office Automation Marketplace Experiencing A Lull

One of the most interesting aspects of what's happening in the office automation market is what's not happening.

Stand-alone word processors are, to the surprise of no one, becoming extinct. Lance Brillantine, director of User Services at Butler Cox Omni, the New York-based information technology management consulting firm, noted that the trend is definitely toward the multifunctional workstation. One of the firm's customers was leaning toward the purchase of an IBM 5520 system for its secretaries but opted for personal computers so users could take advantage of the wide range of software.

Molly Upton, editor of International Data Corp.'s Office Automation Reporting Service, sees increasing interest from OA quarters in decision support tools. She also has seen some excitement on the electronic mail front, specifically from managers being able to access prepreprinted reports via electronic mail. "If there is anything that is propelling the traditional office automation function, it's electronic mail," Upton said.

On the less technological front, there's nothing new in copier technology. The screens on terminals are still pretty much green on black, and no one but IBM has entered the glass plasma display arena. Integrated software packages are being used extensively, but very few users are utilizing much in those packages except for the spreadsheet portion. While a great deal has been made of the importance of having the same kind of workstation on the desk of a manager and support personnel for the most part, managers still do not type, so the work continues to be done exclusively by the support staff. The biggest nonsurprise of all, of course, is the fact that office automation has been pretty much absorbed by MIS.

On the other hand, just because there are no earth-shattering occurrences, doesn't mean nothing is happening.

Wang Laboratories, Inc. continues to make the news. In early April, J. Carl Masi, Jr. resigned as executive vice-president for sales and marketing. Masi's departure follows by less than a year that of John Cunningham who was president of Wang until last July. Masi played a

big role in introducing Wang's newest line of computers, the VS 5 and VS 6, which Wang is positioning to take on Digital Equipment Corp.'s Microvax II. However, a noted industry analyst stated that because it is a foregone conclusion that MIS is indeed taking over the OA function in most organizations, Wang will have an even tougher row to hoe because the company has never had much credibility with big-iron managers.

IBM finally announced its long-awaited lap-size unit, the PC Convertible. The existence of which has made monkeys out of industry watchers and journalists for almost two years. The same day Big Blue announced its

OA UPDATE

Convertible, it announced increases in storage capacity for its Personal Computer/XT and a faster model of its Personal Computer/AT. At the same time, IBM announced price changes that brought the costs of the new enhanced models closer to those of the older ones, further fueling speculation that the original Personal Computer and PC XT will drop below the horizon in the not-too-distant future.

DEC is forging ahead on the path toward connectivity. Not only has DEC concentrated on allowing its own proprietary products to talk together, but the company has taken the lead in connecting other vendors' offerings with its own. While most of the industry is in the economic doldrums, DEC announced a two-for-one stock split in March.

While the industry Goliaths try to push departmental computers as the new hardware technology, users armed with powerful slingshots seem determined to link their existing base of personal computers into local-area networks. During a recent user survey conducted by *Computerworld Focus*, a majority of respondents either have or are planning to purchase local-area network technology. Those that are using departmental computers for office automation, primarily word processing, are

making so-so that their personal computer word processing and software can be uploaded and downloaded with ease.

The health risk associated with VDTs seems to be an issue that can't be resolved or proven but won't go away. Most recently, Sweden's National Board of Occupational Safety and Health and the National Institute of Radiation Protection issued a joint statement warning that "low-frequency pulsed magnetic fields of a kind similar to those appearing in VDTs and TV sets seem to have an influence on the pregnancy outcome of mice and rats." The study went on to say that no conclusions about pregnancy outcomes in human operators of VDTs should be assumed and that further research should be conducted. In response to the Swedish study, the Santa Monica, Calif.-based Koffler Group, a consulting firm on information technology and ergonomics, issued a press release stating that the rodents in the Swedish study were not exposed to computer screens; rather, the pregnant mice were actually exposed to pulsed magnetic fields emitted by coils energized with electricity. The Koffler group has taken a stand against legislation that would regulate the use of VDTs in the office. "Instead," explained Richard P. Koffler, president of the Koffler Group, "we encourage management to listen to the concerns of VDT operators. Management should be proactive instead of reactive."

The big news on the graphics front is the announcement of an industrywide graphics interface standard expected to eliminate the incompatibilities of various vendors' graphics adapters. Already a panel of hardware and software manufacturers including Borland International Inc., Intel Corp., Adstion-Tate, Software Publishing Corp., Lotus Development Corp. and Texas Instruments, Inc. have announced their support of Graphic Software Systems, Inc.'s Direct Graphics Interface Standard (DGIS). According to a spokeswoman at Borland, DGIS lets software publishers from the task of writing a series of device drivers for their programs. The movement of the drivers to silicon saves memory, speeds up graphics processing times and relieves applications developers from having to write drivers for each new device that hits the market.

Microcomputers Pushing Electronic Publishing Systems Into The Office

Seems like the only computer companies doing great business these days are the ones offering systems geared to cut operating costs to companies. A case in point is the corporate electronic publishing system (CEPS) industry, which, according to some market research firms, is ready to go off the sales charts.

CEPS involves firms bringing in their own electronic publishing systems to handle everything from small hard-copy reports to glossy brochures, annual reports and equipment documentation.

The CEPS industry has been around for several years but was slow to grow because the systems offered were big, complicated and very expensive, costing anywhere from $500,000 to several million dollars. Sophisticated in-house staff was also required to run the systems, and the work flow was usually not busy enough to justify going in-house rather than farming the work out to publishing houses. Another problem was the recognition that most publishing jobs required by corporations were not of the glossy, expensive variety: much of the work was for smaller, departmental projects where quality and image were not terribly important.

Trouble was the technology did not exist to make inexpensive, in-house computer-based publishing systems. The microcomputer changed that. Now there is a dynamic, computer-based in-house

publishing industry being shaped that takes advantage of both the huge numbers of micros in use in U.S. firms as well as the expertise gained by micro users over the past few years.

The present CEPS industry, according to Paul Lewis, director of Intercomsult, Inc., a Cambridge, Mass. researcher firm, is made up of four markets. At the high end are what Lewis termed the electronic process color systems that create high-resolution, color prepress artwork in the same league as ad agencies and that are priced from hundreds of thousands to several million dollars.

Below this are the presentation color systems used for proposals, slide shows and reports that can run up to $100,000. At the next level are the high-performance, monotone publishing systems priced from $40,000 to $50,000.

The low-level market is also the hottest in sales. The micro or desktop publishing industry delivers micro-based systems — in the $10,000 to $15,000 range — that often can be interfaced directly to typesetters to produce newsletters, reports and documentation for individuals and departments. These PC-based systems can be expanded into multiuser systems by adding more PCs and scanners.

Intercomsult's Lewis said the market for PC-based publishing systems hit $500 million in 1985 and predicts a $1 billion market in 1986 that will grow to

$3 billion by 1990.

"There are two basic forces driving this market segment," Lewis explained. "The first is the realization that such systems can cut publishing costs in half. The second is ease of use."

Everybody is trying to get into the act at the desktop level. Apple Computer, Inc. has configured a publishing system built around its Macintosh microcomputer, while Xerox Corp. and Eastman Kodak Co. are high-profile companies that have also targeted the field as a high-growth area.

Another set of vendors has come to

the market with specialized publishing software and hardware upgrades to make the IBM Personal Computer into a low-cost publishing system. Depending on features, some of these systems can cost well under $10,000.

Commercial printing houses are not standing still, either. Though most of these printing establishments frown on the quality of the products these desktop publishing systems spell out, they are buying each low-end systems and providing software communications links with those users who still think these systems are too exorbitant to buy themselves.

Figure 2. Desktop Publishing Units Shipped

NEWS

AFIPS' OA Show Down But Not Out

In March, Houston was host to the last Office Automation Conference (OAC), which had been an annual affair since 1980.

Despite the critics, OAC's sponsor, the American Federation of Information Processing Societies, Inc. (AFIPS) cited a broadening market definition as the primary reason for ending the annual event in its current form, not the lower vendor and user attendance experienced during the past few years.

"The Houston show had over 17,000 registered attendees and 75 exhibitors," explained Katherine Stormont, publicist at AFIPS, "so we weren't suffering at the gate. The problem has been that the idea of OAC is now too limiting in scope. Of-

fice automation as a concept now contains much more than just word processing and micros. What we have to do is recognize that office automation includes telecommunications and expanded business systems."

To that end, Stormont said AFIPS is considering two options. OAC could become incorporated into a new conference called the Business Systems and Applications Conference, which has been scheduled for March 1987 in New York. The other option would have OAC merging into another new AFIPS-sponsored event, the National Computer Conference Telecommunications extravaganza scheduled for Philadelphia this September.

Q&A from page 6

as departmental applications. This means that a good deal of the processing and file management is done in the department, where most of the information is generated and stays. Yet beyond that is the need to distribute data bases because there is information that is seldom simply departmental in scope, without relationship with divisional or corporate information. That's a big concern with people.

What were the reasons given for wanting to implementing departmental systems?

The most critical reason given was to provide better support to end users. Next was the feeling that departmental systems would help firms become more com-

petitive, placing departmental computing within a more strategic corporate approach.

Any other interesting results?

Almost everyone said integrated software was critically important, but only 7% said the Unix operating system was important in the office. There's been an attempt by Unix vendors to push Unix's portability and multiuser capability as the answers to office computing. Leading corporate users feel differently.

The last point is IBM's Systems Network Architecture (SNA). Over 73% of the companies we surveyed said the ability to interface with SNA is now critically important in equipment selection.

— *Stan Kolodziej*

LETTERS

A Dynamic Technology

It was a pleasure to see the well-balanced coverage you gave to the subject of computer-aided design and manufacturing in the March issue of *Computerworld Focus*.

As several of your authors noted, engineering computing must increasingly be considered in light of a company's overall information needs.

With respect to my own article in the March issue of *Computerworld Focus*, "Putting CAD / CAM Into Place," an update may be in order. From the time that the article was originally written, the objectives have remained very much the same.

Important advances, however, have been made in such integrating technologies as solid modeling and data bases for computer input microfilm.

A key point from earlier national productivity studies is that our productivity problems would disappear if only we managed to implement the best available technology just one year earlier. With computer-aided design and manufacturing, the basic software technology in use at most companies is more than a decade old. An important service that *Computerworld Focus* can provide is to continue to keep us informed of the latest and most significant advances.

Peter Marks
Vice-President
Product Planning and Marketing
Automation Technology Products

ASRS Article Hits Home

I enjoyed your March 13 issue of *Computerworld Focus*.

I have felt for a long time that *Computerworld* spends too much time on the financial (business) aspects of MIS responsibilities and not enough on the ancillary responsibilities such as manufacturing. Having been involved with automated storage and retrieval systems (ASRS) and other automated materials handling projects for more than 10 years, I have dealt with many MIS departments and their first attempts to become involved in manufacturing activities.

Ms. White's article, "An Imperfect Union," on automated storage and retrieval systems hit home.

James H. Jarvis
S&J Group
Clearwater, Fla.

NEWS

LU6.2 Market Heats Up As Big Name Vendors Unveil Products

IBM has created another hot market. LU 6.2, IBM's peer-to-peer communications protocol, is off and running, with several vendors introducing products based on the LU 6.2 standard.

In the past couple of months, Honeywell, Inc.; Tandem Computers, Inc.; Systems Strategies, Inc. and Data General Corp. are among the companies that have come out with LU 6.2 products.

Others on the verge of product announcements include Harris Corp., AT&T, Hewlett-Packard Co. and Wang Laboratories, Inc. Apple Computer, Inc. has also been working with a software vendor to produce an LU 6.2 emulation product, which is expected to be announced soon.

Digital Equipment Corp. has been leading the pack, having introduced an LU 6.2 product about one year ago that allows DEC workstations to look like LU 6.2 machines attached, through gateways, to IBM's Systems Network Architecture (SNA). (LU 6.2 resides in the sixth, or presentation layer, of SNA.)

"LU 6.2 has been coming on strong," explained Lee Doyle, senior communications analyst at Framingham, Mass.-based International Data Corp., "because minicomputer vendors like DEC and Wang perceive that they can use it to strengthen their push into the mid-range office computing area, where IBM is weakest."

IBM has been increasing its LU 6.2 product line but not fast enough for many users. While interdepartmental communications has become important in the office, IBM is coping with a legacy of noncommunicating products that has come back to haunt it.

"LU 6.2 is one of IBM's big attempts

to reverse a history of introducing a new protocol each time the company introduced a new product to its SNA architecture." Doyle explained. "These products, from microcomputers, minicomputers and mainframes, couldn't talk directly to each other."

With the increased power of microcomputers, Doyle added that IBM has been under more pressure to give users of microcomputers the direct benefits of LU 6.2 peer-to-peer communications with other workstations, minicomputers and mainframes without the hassle of channeling communications through protocol conversion software resident in controllers, file servers and larger computers. IBM to date has been gradually filling the gap with LU 6.2 capability for its System/36. System/38 and Personal Computer plugged into its Token-Ring local-area network, but the pace has been slow for many users and industry observers.

Others are skeptical that the current vendor flurry of LU 6.2/SNA products will be sustained.

"It could very well turn out that LU 6.2 is the foot in the door that IBM needs in order to slip into new customer installations," stated a new report from International Resource Development, Inc. (IRD) of Norwalk, Conn. "The reading and interpretation of the published [LU 6.2/SNA] standards can take up too much of the research and development time and money of all but the most dedicated IBM followers, making compatibility with the changing SNA products an expensive undertaking."

Another drag on the LU 6.2 marketplace is IBM's slowness in getting the final LU 6.2 standard implemented. Part of the problem stems from the fact that LU

Figure 1. Application Programs in Systems Communicate Using LU 6.2

6.2 is not a single protocol but a framework for housing several different protocols.

The protocols within the LU 6.2 framework will support the same basic communications functions, but not all will support advanced LU 6.2 communications. While IBM intends to migrate from incompatible logical unit (LU) types (there are currently eight) within SNA to a single LU type — LU 6.2 — some analysts say it will be a few years yet before IBM comes up with a truly competitive peer-to-peer communications capability.

A big plus for software developers is IBM's Advanced Program-to-Program Communications (APPC/PC) Toolkit, which is now being shipped and will provide vendors of micro-to-mainframe software with the means to build LU 6.2 interfaces.

The Toolkit is expected to help build the LU 6.2 market from what is essential-

ly a standing start that IRD predicts will be an $800 million market by 1990.

Though LU 6.2 is making strides in North America, the European situation is much different.

Recently the European Computer Manufacturers Association (ECMA) rejected IBM's proposal to have LU 6.2 as one of the bases for the emerging Open Systems Interconnect (OSI) communications standards. Forming a front against IBM, the ECMA members' rejection was ostensibly based on technical considerations, stating that LU 6.2 contradicts existing specifications within the OSI standard.

Some observers, however, have said the true reason for the thumbs down from ECMA was fear that if the LU 6.2 protocol was adopted within OSI, IBM would have a two-year lead in developing and bringing to market products based on LU 6.2.

Corporate Preoccupation With Costs Spurs Telephone Management Sales

Telephone management information systems (TMIS) have been slow off the mark since VMX, Inc. of Dallas introduced the first system several years ago. That might be changing.

The corporate concern for cutting communications bills has generated more interest in these stand-alone messaging systems that, along with switching incoming and outgoing calls, can analyze call traffic patterns within networks, create call accounts and even produce built-in inventory and billing reports.

Most telephone management systems have the ability to interface with several computers and to branch exchanges from various vendors, especially from large PBX makers such as AT&T and Northern Telecom, Inc.

Though most private branch exchange makers offer their own telephone management systems, they usually work on a proprietary basis, interfacing with only a specific line of PBXs from those vendors.

Private branch exchange makers use this as leverage to lock in users to their own systems. Independent telephone management information systems vendors, however, give users the ability to buy their TMIS separately and plug them into any number of private branch exchanges, a feature more users are opting for since many large corporations have

more than one brand of private branch exchange spread throughout the organization.

Another sales stimulus has been the drop in TMIS prices over the past year or so.
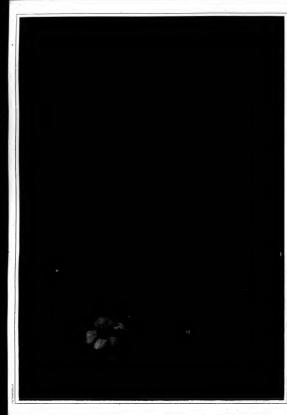
VMX's first system was big and cost half a million dollars. Now TMIS products, such as the Aspen from Octel Communications Corp., Milpitas, Calif., range from $20,000 to $40,000, depending on features.

"What we're seeing is the third generation of telephone management systems coming into the market," explained Dave Torrey, Octel's marketing manager. "Very large-scale integration technology has helped lower the prices and increase the power of the systems. Also, the lack of standards for intervendor networking has made users look to something that can interface and link PBXs and other equipment."

Torrey said Octel's own research outlines a TMIS market that at this stage is only 1% or 2% penetrated. "There are at least 70,000 PBXs and [AT&T] Centrex systems out there," he added. "It's a big market,"

Probe Research, Inc., a Morristown, N.J.-based communications research outfit, calculated that the TMIS market in 1985 reached $142 million and expects that figure to double in 1986.

USER SURVEY

New Life For The Info Center

· B Y · L E E · W H I T E ·

In 1980, just a few months before IBM announced its Personal Computer, the IBM-created information center concept crossed the border from Canada to the U.S.

Don Cyrog, supervisor of the Information Center for the Salt River Project, the largest electric and water utility in Arizona, remembers hearing about information centers at an IBM Guide users group meeting in 1980. The Salt River Project started its center in January 1981, the first in Arizona to do so and one of the first in the country.

But for most of us in the early years of the decade, the words "information center" meant nothing at all. For that matter, the only people outside MIS who used computers were the people in departments such as order entry, credit or accounting.

How times have changed. At the same time that the invasion of micro hardware took place, so did the growth of support staff charged with teaching everyone how their lives would change once they mastered the nifty little machines.

Sometimes these "teachers" were MIS people; more often than not they were among the avant-garde who had been playing with computers on their own for years. Soon, however, personal computers graduated from oddity to desk fixture. Since that time, training corporate America to make good use of its personal computers and learn to use the friendlier and more sophisticated software on mainframes became a full-time job not only for the part-time techie but also for the thousands of people across the country who had become info center staff members.

Since information centers have become a vital fixture in business, *Computerworld Focus* interviewed a number of information center managers to find out how their centers are faring, how their jobs have changed in the past two years and what changes they anticipate in the next few years. The people selected for the survey were culled from a list of randomly selected names of attendees at the 1985 Information Center Conference in New Orleans, supplied by Weingarten Publications, Inc., sponsors of the conference.

What we found out is that information centers have themselves become big businesses. Although staffs are not large (most numbered between three and 10, with only one company of 6,000 having 27 information center staff members), all the centers support both mainframe and personal computer products, and the number of end users range from 10% of the total employee population to a whopping 50%.

Computer literacy, according to those surveyed, is a term of the past. Increasing end-user sophistication is the key word today and, although it would seem that this sophistication would make the day-to-day lives of information center employees easier, most say that servicing the needs of the companies' populations is becoming more difficult.

"We're busier," explains Pen ny Peticolas, manager of the Information Center for the Columbus, Ohio-based Ashland Chemical Co. Peticolas has a staff of three consultants and one programmer who support the needs of 200 end users out of a total population of

1,000 at company headquarters. While her staff is able to keep up with the changing technology, they cannot keep up with the expanding needs. "It's not the technology that is the problem; it's simply the growth in the number of people needing our help," Peticolas says.

Pat Engstrom, manager of the Information Support Center at the Pittsburgh National Bank, says that her 10 staff members, who support about 500 end users, are working twice as hard now. "The smarter [the end users] become, the more things they want to do and the harder you have to work to make sure you're one step ahead of them to be able to provide them with the help they need. Things are changing so rapidly, and the environment is changing every day. It's not going to get any easier."

But Robert Gabor, manager of the Information Center at Sunkist Growers, Inc. in Sherman Oaks, Calif., casts something of a dissenting vote in the user sophistication area. "We look at things programmatically and logically and say, 'Well, that shouldn't really work.' But our end users try it, and it does work. That helps us. In our sales area we have one individual who really understands the data, so people kind of migrate to him. When he has things he can't answer, he comes to us. We've developed a couple of buffers from our end-user base to kind of offload our consultants."

User sophistication is only one of the changes these managers are going through. All found that the demands placed upon them have all but slammed the door to hands-on work in the center. Ron Els

wick, director of the Information Center and of Office Automation at the Federal Reserve Bank in Dallas, says he did quite a bit of hands-on computer work four years ago. However, now that the center supports 700 end users out of the bank's 1,500 employees, Elswick finds that his information center manager and six consultants have taken over that aspect of the job.

Ashland's Peticolas is currently writing justifications for staff additions and a business plan for her center and has little time for hands-on work. "For the past two years we have been operating at the pleasure of general management. But now I'm interviewing division vice-presidents and revising my budget for the next quarter." Engstrom of Pittsburgh National Bank misses the good old days "to some extent," but makes sure that she sits down and "plays" on a fairly regular basis. "I think it's important that an information center manager keep that touch. How can I be selling tools or working with users who are using tools or talking to management about these tools if I don't understand them?" she asks.

Elswick sees the job of information center manager as a continually evolving one. His own job has not been the same for a one-year period in the past three or four years. "I got a new job description in January 1985, and we're supposed to be evaluated according to the performance criteria in the job description. My vice-president couldn't do it because the job description [one year later] no longer fit," Elswick says.

Reporting status is another change that information center

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USER SURVEY

managers have had to deal with. While most of the managers in the survey report through the traditional MIS department, such is not the case at Hercules, Inc. a 25,000-employee chemical company headquartered in Wilmington, Del. Hercules has a vice-president of information resources. Ross Watson, who reports directly to the president and chief executive officer. According to Joan Ferrara, manager of the Hercules Information Center, three people report to Watson: the head of the computer systems department, the traditional MIS department involved with the machinery and development work for the corporation; the person in charge of the office automation department, which includes communications, and Ferrara.

Stan Leader, manager of the Information Center at Capital Blue Cross in Harrisburg, Pa., reports directly to the vice-

> '*I never wanted to get the group into a position like traditional data processing has been where you take on an assignment and you either can't complete it or it takes forever.*'
>
> — Joan Ferrara
> Hercules Information Center

president of information services. "We're consolidating our data processing entities. We have a facility called the Shared Services Center, and we have put all our major data processing types within this center. The company wanted to still have a small group of people who could more or less be the liaison between the mainframe and the users," Leader says.

Management at the Federal Reserve Bank in Dallas has taken different tacks in the evolution of its information center. Three years ago the information center was a separate entity, Elswick explains. At that time, top management wanted to focus attention on the center to show its support. "So they separated us out and permitted me to report directly to a single vice-president as a separate organization. We were able to be right up at the top of the organization, we knew what was going on, knew where to apply the resources to soup up the organization, got the most bang for the buck. And it paid off," Elswick says.

Late in February, the Federal Reserve reorganized and put the information center back with the traditional application development people. Elswick attributes this reorganization to the need for what he calls the second offensive in end-user computing, that of using a development center to hit some quick development applications and also support training DP people so that they can start applying the techniques that have evolved over the past few years. "The objective is not to write every last report that is going to be developed in a system but rather to create a base of data and provide end-user access to that data. That way, hopefully, instead of helping users develop the data bases, which we do now, the information center can concentrate on consulting-type questions," Elswick explains.

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CIRCLE READER SERVICE NUMBER 163

All of the surveyed information center managers expect their jobs will change appreciably in the next couple of years. The Salt River Project's Cyrog, who estimates that of his company's 6,000 employees, 2,000 could be considered end users, says he hopes that the next few years are not as hectic as the last two. "Right now we are migrating from an [IBM] MVS environment to VM, so that has caused a lot of retraining, rethinking, new standards and all the peripheral things that go with making a major environment change," he says. In addition, the company is decentralizing from one information center to satellite centers in other buildings, primarily to be closer to the user community.

But wishing probably won't make it so for Cyrog. His group is looking at local-area networks that will involve more products, more training and closer supervision. They are also going to be linking personal computers and minicomputers and mainframes. "Our departments usually think of themselves as being pretty isolated — engineers only having engineering applications and accountants having only accounting applications. But now that we are spreading corporate data more widely, we have come into some very large data base applications that are companywide. That will bear a lot of watching," Cyrog says.

Hercules' Ferrara echoes much of what Cyrog says. In the past, her feelings about what an information center staff should and should not do were based in large part on development activities. "I never wanted to get the group into a position like traditional DP has been where you take on an assignment and you either can't complete it or it takes forever. I have always said I'll do anything I have to [in order] to help the users develop their own systems, but I won't develop [the systems] for them," Ferrara insists.

However, she thinks there is a real need, one that is not being addressed, for systems development on personal computers. And this may be the direction in

USER SURVEY

which her information center may go next, but she sees it being done in an adjunct group. "It seems logical to me that it would report to the same area that the information center does, mainly because of the tools being used and the closeness the information center has already established with the user. Many times we find traditional DP groups have tunnel vision when it comes to developing imaginative systems using the personal computer," Ferrara adds.

Tunnel vision is not the only epithet gently thrown at the traditional DP types, however. Information centers were created not only because there were new needs that had to be addressed. There was also the realization that a different breed of person was required to bring computing to the masses.

While all of our respondents say that at least half of their information center staff consists of classically trained DP people, they either state or strongly infer

> "
> 'I don't care how technical you are, if you aren't a people person, you won't make it. That's what will make or break an information center.'
>
> — Pat Engstrom
> Pittsburgh National Bank

that the kinds of people making up information centers are worlds apart from those in the MIS mainstream. As one of the surveyed managers says: "I have something on my wall that says, 'Every organization is an reality the lengthened shadow of its leaders.' You have to stop and realize that your attitude is the attitude that your people are going to give to other people. You can't go too far in trying to convey a helpful type of outlook, a cooperative spirit. I was previously manager of our data base group, but they told me I was the only one in the whole organization who is right for this job [as information center manager]."

Pittsburgh National Bank's Engstrom says members of an information center must be people people. "I don't care how technical you are, if you aren't a people person, you won't make it. If you can smile, listen and try to give people a solution, you can make a mistake. People will accept your mistake as long as you attempt to correct it if you have a good personality. That's what will make or break an information center."

But another make-or-break criterion for information centers has to be how the centers are viewed by traditional MIS people. As surveyed by *Computerworld Focus*, only one says that the relationship has always been excellent. Elswick, whose information center just became part of MIS, feels that MIS acceptance has just begun. "I have spent more time with the managers in MIS[in the last two weeks than I did in

the past two years. That tells me something," he says.

At the risk of having our reader community call community integrity an oxymoron, we have chosen not to ascribe particular comments regarding MIS views of the information center to particular information center managers. But the comments include the following:

"The MIS department was the biggest obstacle to the success of the information center."

"If I were to pick one word, I would say jealousy."

"They felt threatened by the information center."

"I would say we're viewed with skepticism ranging up to distrust and doubt. I asked one manager, who is sympathetic to what we are doing and with whom I have a very good rapport, what we had to

do to be taken seriously, and he said, 'Damned if I know!' "

"People are trying to take away some of the functions we have because we do it so well and get such good publicity."

"There is some resentment because we are more visible, more glamorous and people see what we are doing as kind of fun."

Along with the near unanimity regarding MIS' view of information centers is the unanimous response to users' views of information centers. Just before Ashland Chemical's Peticolas spoke with *Computerworld Focus*, she had spoken with two vice-presidents, both of whom called the center essential. "They said that they would pay for our services if we charged for them, that they expected their use of us to increase by 75% to 300%," she says. Ferrara from Hercules

thinks her information center is very highly thought of, and Elswick of the Federal Reserve Bank of Dallas says he is confident that the user community is well satisfied.

Whether the information center concept continues to exist as an entity of its own or whether it becomes just another cog in the MIS wheel might, with any luck, become just a matter of semantics. The user community will not give up what they have come to expect from the information center; if MIS chooses to take over the information center concept and is willing to provide the kind of nurturing for which information centers have become famous, clearly everyone will come out winners.

While is a senior writer at Computerworld Focus.

MARKET ANALYSIS

What Will The Vendors Offer?

· B Y · A N D R I A · R O S S I ·

Two years ago the industry was struggling to define an integrated office system. Vendors, industry press and consultants all had a different view on what ingredients were necessary to build or evolve an architecture into an integrated office system. Today, all vendors market what they consider to be such a system. What many vendors overlook, however, is that an integrated office system must go beyond the support of office applications to provide a set of integrated business tools in a networked architecture.

The most widely accepted and marketed integrated office software is offered on departmental systems, also known to many as small business computers. The vendors most recognized in this area are Data General Corp., Digital Equipment Corp., Hewlett-Packard Co., IBM and Wang Laboratories, Inc. Each of these vendors approached development of its integrated office system offering from a different angle. The sacrifices these vendors made to produce an integrated solution in what constitutes the differences between their products. Although most vendors would welcome the option to pioneer a new technology, they are also constrained by the widespread demand to conform to industry standards — particularly those set by IBM.

Vendors are juggling their research and development dollars. Should they integrate their existing applications more tightly? Should they enhance their product line by pioneering a new technology? Is interconnectivity to IBM architectures or even competitive products the highest priority?

Some vendor strategies are more attainable than others.

There are many intangibles that must be considered prior to announcing an intention to build an integrated office system. Vendors such as IBM and Wang have a very large user base they must secure and consider in new product developments, while others were late in projecting the impact integration would have in the office. So each vendor took the quickest and most strategic avenue to evolve its product line into an integrated office system.

■ Data General Corp.

DG built its Comprehensive Electronic Office (CEO) as a tightly linked set of applications. As the products matured, DG placed more emphasis on integrating these applications within the file system and among each other. In the office system marketplace, DG's products earned the reputation for being the furthest ahead in integration at the application and file levels of the hierarchy. The company's recently announced voice products — integrated voice/data terminals and voice store-and-forward software — are examples of DG's thrust to integrate a range of office technologies.

DG managed to keep the user interface consistent among applications supported by CEO. Even in CEO Write (the Microsoft Corp. MS-DOS version of CEO word processing), an experienced CEO user will hardly notice the transition. Unlike many other office system solutions, CEO offers a variety of end-user customization options for each application and in the file system.

A user can customize applications to reflect his working style via a personal profile.

DG's interconnect strategy includes a recently announced IBM Distributed Office Support System (Disoss) gateway to distribute revisable form files to other Disoss users via IBM's Document Distribution Services. CEO Connection is a DG-developed communications link used to connect IBM PCs to DG's departmental processors.

A personal computer user gains access to all CEO applications while having the option to operate in a local mode and store or transfer these files to a departmental system. But DG does not offer an automatic polling process in which the host retrieves data at scheduled time intervals from the personal computers to be processed on the host. For example, if autopolling were made available, a personal computer user could remain in an MS-DOS environment, even to create a mail message or request to schedule a meeting, knowing that the host would take over to process and distribute the mail message.

■ **Digital Equipment Corp.**

DEC's approach has always been to build an open-ended system architecture. It even launched its All-In-1 as a customizable office solution encouraging third parties to write software that could be integrated under the All-In-1 umbrella. Consequently, DEC focused on flexibility and hoped others would develop an integrated set of office tools for All-In-1.

All-In-1 Rev. 2 made each solution more customizable. Integrated applications, however, took the form of profession-specific workstation solutions: The links between the programs and the menu screens were tailored to address the needs of specific professions. Currently DEC has announced a solution for sales and marketing and financial professions.

Recently, DEC bridged the gap in its decision support offerings by announcing a program that lets MS-DOS-based spreadsheet data from Lotus Development Corp.'s 1-2-3 be the input to Deccalc, a VAX spreadsheet program. DEC went one step further to include the exchange of spreadsheet attributes and formulas in these transmissions. Prior to this announcement, DEC used the VAX script processor to transfer 1-2-3 data into a DEC Datatrieve file.

All-In-1 applications are feature rich and very flexible but still not integrated. You can interrupt any application to get into another but the combination of files from multiple applications to produce a compound document is only viewed on a printed copy.

In the past year, DEC has focused developments in the area of network interconnect. Decnet services extend beyond network monitoring and file distribution to include multiple gateways to access IBM hosts for both data and text retrieval. The network directories are an example of the flexibility DEC incorporates into all program and system designs.

AT&T DATAPHONE II System Controller

AT&T 724 Multiplexer

AT&T PC 6300 AT&T Model 4000 Modem

AT&T Multifunction Communication System
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MARKET ANALYSIS

■ Hewlett-Packard Co.

HP's approach to the design of an integrated office system was to start at the desktop level and later evolve these concepts to a work group and departmental system architecture. The hub of its integrated office system is the HP 3000 and the Personal Productivity Center, with its Advancenet and Officeshare networks link hosts and personal computers.

In the past few years, HP has focused on developing integrated office solutions for its personal computers. The Personal Applications Manager (PAM) is the shell that provides a common user interface for all micro-based applications. PAM is customisable, therefore allowing users to rearrange the order of the application entries on the screen, a procedure similar to menu customisation. With Executiondesk — a prepackaged set of applications — HP also sports a flexible open-ended environment. Executiondesk was designed to allow end users to add off-the-shelf MS-DOS programs to those offered under Executiondesk, making the interface consistent among all support programs.

While other vendors focused developments on departmental-based applications, HP led the way to IBM Personal Computer interconnection. Advancelink was the first such offering that allows two personal computers — either IBM or HP machines — to exchange data files, eliminating the need for a local-area network. And via HP Front Central, PCs can direct the printing of an MS-DOS file to an HP 3000 host printer.

HP's theory to integrate applications at the desktop level was advanced at the sacrifice of departmental-level integration.

Clearly, HP has created a truly integrated solution for individual users. However, HP still does not have a central file system on the HP 3000 to combine personal computer-created files with those created by terminal users on the HP 3000. Nor will the HP 3000 host automatically back up or poll the PC files that are to be stored in the 3000 file system. And while there is consistency among the microcomputer-based applications, there is no consistency between the microcomputer and those supported on the HP 3000.

> **HP's theory to integrate applications at the desktop level was advanced at the sacrifice of departmental-level integration.**

■ IBM

IBM, like Wang, had a number of existing office products to select as its integrated office system solution and had a very large installed base that needed to be

competitive offerings.

The System/36's ancestry goes back to the System/3 that was introduced in 1969.

IBM's goal for the System/36 was to design a friendly, small business computer. In late 1984, however, IBM which positioned the System/36 as its integrated office system offering by announcing Personal Services/36, Query/36 and Displaywrite/36. Couched in with Release 4 of System/36 announcements in January 1986 was IBM's direction for the System/36 — another method to reinforce its 1984 position.

IBM has realized that through the years it has produced a line of incompatible systems. Via IBM Document Interchange Architecture/Document Content Architecture, LU 6.2 and even Displaywrite and Personal Services versions, IBM is attempting to bridge the gap between its product offerings. Yet by doing so, IBM had to pull together programs that were designed for other systems. This led to less than satisfactory performance for System/36 and made the process of integrating applications more difficult.

Thus, integration is minimal on the System/36 how is there a common interface among its applications.

The System/36's applications are also not as functionally rich as competitive offerings. To compete as a departmental system offering, the System/36 must support more decision support programs than are currently offered. However, the System/36 was modularly designed with a pipeline operating system to accommodate additional hardware and software expansions. The System/36 is IBM's choice offering for the office. With IBM's blessing and its modular architecture, the System/36 could potentially evolve into a competitive offering for the departmental systems arena.

■ Wang Laboratories, Inc.

Wang has always been synonymous with office automation — that is, when office automation equaled word processing. But Wang lost its foothold in that market when minicomputers disguised as departmental systems evolved into integrated office systems. Wang had the same problems that plagued IBM. All of its office products were based upon different operating systems, thus requiring a bridge to close the gap between the company's Office Information Systems, Alliance, Wang VS and PCs. Wang Office became the umbrella solution, while Wang Office File Manager became the central file system used for archival storage.

Wang Office is VS based; a PC version is marketed as PC Office. While the product provides a common interface shell for electronic mail, calendar/scheduling and reminder functions, this consistency has not been extended to PC Office applications.

Nor will a user be comfortable switching between Wang Office Applications and Wang's the Professional Application Creation Environment (PACE) because all three employ different operational methods.

Wang is another vendor lagging behind in application and file integration. Although Wang was the first vendor to offer a voice store-and-forward program on an office system, the company's program — DVX — has still not been integrated with text mail for a combined delivery of voice and text messages.

Wang, on the other hand, does offer a variety of local-area networks — from its Local Interconnect Option (LIO) (PC network) to Fastlan and Wangnet (its broadband offering). The new single-cable implementation for Wangnet supports the direct linkage of IBM 3270 devices.

And Wang, too, has embraced the IBM PC into its architecture by offering connection to its LIO network, PC Office support and the option of running a version of WP Plus locally, with or without a Wang keyboard.

Although the office applications made available are not integrated, they are functionally rich and competitive offerings. WP Plus maintains Wang's leadership in word processing, while PACE upholds Wang's image to be a leader in easy-to-use systems and programs. The holes in Wang's office solutions are surmountable: Wang needs to develop a strategy to achieve tighter integration among its applications and within the file systems. One way is to make PACE the underlying data base for its network directory services and file management software.

Each vendor approaches the developments of its office solutions from a perspective it deems necessary to secure its installed base while trying to carve a niche as a major player. Every vendor is grappling with which direction will lead it to the ultimate in system integration and interconnectivity — the concept of a virtual system.

> **Wang has always been synonymous with office automation — that is, when office automation equaled word processing.**

While DG's thrust is integration among applications and files, DEC's is flexibility within applications and network interconnectivity. HP, on the other hand, focuses on integration for stand-alone users that includes IBM Personal Computers. IBM is still struggling with standards, and Wang continues to focus on ease of use.

No two vendors have implemented strategies that are alike. And, in reality, there is no correct strategy to which every vendor must conform. Most of the vendors are cognizant of user and market needs.

But the vendor must also juggle these requirements with how they can be incorporated into the original design of its products.

It must consider such things as obsolescence, product evolution, future market needs, technological advancements and, most importantly, research and design dollars.

The product development strategy for one vendor is usually not appropriate for another. Yet for the users, this translates to a wider range of options to select from — each vendor's solution solves a different set of problems that exist in the market today.

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LINKING STRATEGIES

Looking At Micro-Mainframe Links

· B Y · C H A R L E S · P · M O R E L ·

Micro-to-mainframe connections are proliferating in much the same way the personal computer did a few years ago — haphazardly. Just as they did with PCs, some users are buying their own terminal emulation products and bypassing MIS managers for control of DP resources throughout the company. In cases where MIS managers do supervise the micro-to-mainframe purchase, some have been pressured into buying products quickly, without considering how this solution will fit into the company's long-term DP needs.

Both cases illustrate a common problem today: Micro-to-mainframe links are relatively new and evolving so quickly that it is easy to be inadequately informed about the capabilities of the many products on the market. The best way to build a fully functional connection is to consider the company's needs and purchase micro-to-mainframe products that will best meet these needs. With users clamoring for these popular new

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> *MIS managers have an opportunity to regain control over expanded computer resources now that users are demanding mainframe connection via their PC. Wise managers will plan the integration of future equipment and specify what that equipment will be.*

tools, such a planned approach is not always easy.

MIS managers have an opportunity to regain control over computer resources now that users are demanding mainframe connection via their PC. Wise managers will plan the integration of future equipment and specify what that equipment will be. But first they need to understand and support micro-to-mainframe links. Support should be easy, given the fact that these connections reduce the DP department's workload and enhance overall efficiency. Because of several myths and misconceptions about micro-to-mainframe

links, truly understanding them is more difficult.

■ *Myth 1: All connections are created equal.* A simple terminal emulation board is a different animal from a sophisticated micro-to-mainframe connection product. Terminal emulation forces an intelligent microcomputer to act like a dumb terminal. Although it gives the user interactive access to host applications, it is incapable of allowing PC application software to access and manipulate the data. Users need a micro-to-mainframe connection with application program interfaces (API) that are

used by PC software to perform file transfer and manipulate data. APIs provide application programs with a formalized method of requesting services from the micro-to-mainframe link. In other words, they let PC and mainframe applications interact.

Between the simplest emulation boards and the most advanced micro-to-mainframe connections are a variety of products with differing capabilities. MIS managers should match these features with the PC user's needs. Important functions like keyboard mapping, windowing, screen presentation, method of operation, installation and customization procedures vary from product to product.

As a firm begins to incorporate these varying products into a network, the issue of uniform APIs becomes critical. Some manufacturers offer different APIs across their product lines. At the very least, MIS managers should choose a manufacturer whose products are compatible and have consistent APIs. This allows the coaxial and remote micro-to-mainframe products to work together

LINKING STRATEGIES

with the micro-to-mainframe application software chosen, whether your products provide graphics, gateway, multiple- or single-session capabilities. Consistent APIs also shorten the time required to develop additional application programs and simplify the upgrading and training tasks.

At the heart of this situation is a lack of standards. Most manufacturers' boards have unique interfaces, locking customers into that particular system. A widely installed interface is on the Digital Communications Associates, Inc.'s Irma board, which was one of the first emulation products in the market. However, IBM's recently released API for the 3270 Personal Computer will probably become the de facto standard. A sensible solution is to invest in a product line that offers multiple and consistent APIs.

Companies with emulation products in place that want broader, more advanced features should also choose vendors that support multiple APIs. This will allow them to take advantage of the broad selection of micro-to-mainframe software on the market today.

In their rush to connect to the mainframe, users have accepted costly temporary solutions that ultimately do not meet their needs. To avoid having to deal with incompatible connections, MIS managers must take stock of their needs and plan before purchasing.

■ *Myth 2: Micro-to-mainframe products are independent from the rest of a company's computer resources.* A micro-to-mainframe connection is more than a board that fits into a PC with some accompanying software. The other im-

portant elements of the connection are the application software resident in the host and PC as well as the specific API employed.

And there are more items to consider such as what other PCs are used in the company and what local-area network, if any, exists. Ideally, all computer resources are compatible. In reality, it takes careful planning on the part of the MIS manager to realize this goal.

Surprisingly enough, some buyers do not check to make sure their emulation hardware supports the application software they are likely to use on both ends of the connection. Investigate the compatibility beforehand and also check to see if additional hardware is required to complete the connection.

To help create a family of computer resources that all work together and facili-

tate office automation, pick your micro-to-mainframe vendor carefully. Make sure the vendor's products are compatible, not only with one another but with the hardware and software in your company. To stay abreast of application software, choose a product line with a consistent and uniform API that is compatible with those being written to by mainframe software developers.

■ *Myth 3: All user needs are the same.* It is doubtful that one micro-to-mainframe product will fill all needs forever. Companies have many types of users, from data entry operators with routine tasks to financial analysts and system programmers with more complex requirements. In addition, the needs and sophistication level of users change over time. For some, a simple terminal emulator will suffice. Others need the comprehensive, interactive features provided by multiple, concurrent host sessions, in-

cluding concurrent keyboard display sessions and printer sessions.

A vendor that provides an upward migration path as well as a variety of compatible products will offer MIS managers a way of protecting their investment in micro-to-mainframe connections as user demands change.

It makes more sense to buy a less complicated product and "grow" it. Look for products that can be upgraded without requiring changes to existing micro-to-mainframe hardware. A complicated product that is well beyond a user's needs will cause frustration and ultimately waste money. Equally wasteful is buying boards that are incompatible with other products and have no add-on features, then throwing them away when it is time to upgrade.

Buying an entirely new product is more expensive than upgrading an existing product. For example, companies whose potential "power users" have IBM PCs or compatibles and a terminal emulator can get the performance — and beyond — of a complex 3270-PC by simply adding software to their micro, saving several thousand dollars.

If accessing and manipulating mainframe graphics and alphanumeric data is likely to become crucial at a later date, choose micro-to-mainframe products that are compatible with existing emulators and micro-to-mainframe connections. Anticipate tomorrow's needs and buy a product line that will take you there.

Just as users needs vary, so do their locations. Users in remote sites who still want connection to the company mainframe are sometimes overlooked just because they are not around. Budgeting for

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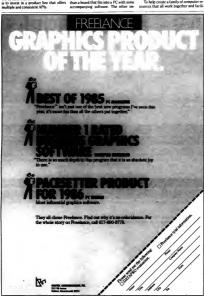
LINKING STRATEGIES

remote access to mainframes can be more complicated because of the difficulty of estimating the actual cost of leased telephone lines. However, gateway problems can result if the remote connection is purchased from a different manufacturer. Coaxial and remote connections compatible with the same interface eliminate time-consuming changes to host software. To prevent complications, MIS managers should choose one vendor with a consistent product line that includes remote connections as well.

Also at issue in choosing a long-term product is maintenance and future growth, because MIS managers do not want to be left in the dust when technology changes. To upgrade your current products, the easiest and least potentially harmful method is through software upgrades on floppy diskettes rather than on programmable read-only memory disks that necessitate replacing chips on the emulation board.

■ *Myth 4: Multiple sessions are not a practical feature for most users.* One of the most advanced capabilities of a micro-to-mainframe connection — unlike that of a simple terminal emulator — is multisessions. The user can access several host applications concurrently without signing on and off, display the information in windows on the PC screen and manipulate the data in notepads using a spreadsheet or other format.

Despite this impressive capability, some have questioned the need for such a function, believing it is only for power users. As a result, they buy a terminal emulation product that can only access one mainframe application at a time. It is important to remember that multiple host sessions are not only for getting at several applications at once. They can also be used to turn PC printers into host-addressable printers and to run concurrent file transfers, even though they still appear as a terminal emulator to the user. These are important capabilities that significantly increase system functionality.

MIS managers who need terminal emulation products now — and who think they might make good use of the multisession capability in the future — should choose a vendor offering both a multisession software upgrade and a broad, compatible product line. Otherwise, there might well be training and compatibility trade-offs. Once again, careful initial vendor selection will avoid difficulties later.

■ *Myth 5: There is no relationship between local-area networks and micro-to-mainframe products.* Until recently, local-area networks and micro-to-mainframe communications products used within an office were separate from one another.

Local-area networks connected PCs and peripherals, allowing users to share files and printers as well as offering helpful features like electronic mail. Meanwhile, micro-to-mainframe communications linked PCs with mainframes, enabling users to retrieve mainframe data and manipulate it locally but not share information through local nets.

Obviously, a comprehensive network with the features of local-area networks and micro-to-mainframe connections would allow even greater productivity. What is needed is a physical link that provides 3270 capability to multiple PCs on a local-area network. With the introduction of IBM's PC Network in 1984 and the recent unveiling of its long-awaited Token-Ring local-area network, a de facto standard has finally been created, specifically the Netbios interface. Because about 40% of installed PCs are made by IBM, such a standard

has significant weight behind it.

New micro-to-mainframe gateway products compatible with Netbios are now realizing the potential of networking. Companies with local networks have more than one economical option in creating such a connection. They can obtain mainframe access just by adding one card to a PC within the local-area network along with additional software, or some can turn their existing micro-to-

mainframe connection into a gateway with software upgrades.

MIS managers should look for gateways that offer uniform APIs and compatibility with other popular APIs. There are gateway products on the market that allow PCs within the local network to emulate powerful machines like the 3270-PC. All these capabilities give local net users a level of access well beyond what they have previously

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known. Along with resource and file sharing, they can add the sharing of mainframe data bases, access to powerful host application software and the ability to turn shared, PC-attached printers into host-addressable printers.

■ *Myth 6: New communications protocols like IBM's LU 6.2 are rendering existing micro-to-mainframe products obsolete.* Strongly affected by the velocity of technological change, some users and MIS managers identify hardware or technology is immature. For example, LU 6.2, IBM's new enhancement to Systems Network Architecture (SNA), is not a panacea nor is it replacing today's micro-to-mainframe products.

Users today need interactive keyboard display sessions and printer sessions supported by current micro-to-mainframe products. The program-to-program API LU 6.2 will be incorporated into use, complementing existing interactive capabilities as applications are developed to take advantage of it. These facilities require SNA software as well as a physical micro-to-mainframe connection, whether it is a coaxial interface or an RS-232/Synchronous Data Link Control one.

LU 6.2 allows application programs to communicate with one another on a peer-to-peer level. As a method of processing true distributed processing, LU 6.2 will have increasing value in the DP world. However, it is currently available on very few of the many products in IBM's vast line. Implementation is slow, and there is little application software now available

that takes advantage of this new protocol.

This emerging standard will enhance the future capabilities of micro-to-mainframe links. An evolutionary protocol like LU 6.2 is really based in software, thus existing hardware need not be sacrificed to accommodate future functions.

A similar upgrade gaining popularity is IBM's Distributed Office Support System (Disoss), which has actually been around since 1978. Disoss is a mainframe application package that provides an integrated office environment with a standardized software solution to storing and distributing documents. Like LU 6.2, Disoss represents IBM's efforts to integrate and standardize the many different architectures with is its products.

To prepare for the changes that could be wrought by new standards like LU 6.2,

MIS managers need to look for micro-to-mainframe vendors that demonstrate a commitment to supporting these emerging standards.

The user's insatiable thirst for information can now be satisfied through utilizing modern networking equipment like local-area networks, micro-to-mainframe links and the new gateway products. By planning an intelligent scheme that takes into account the company's need for local and remote connections as well as linking to its local-area network, MIS managers can create an effective vehicle for assuming command over their companies' expanding computer resources. ∎

Morel is founder and chairman of CXI, Inc., Palo Alto, Calif. The company was incorporated in 1982 and specializes in micro-to-mainframe computer products.

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TECHNOLOGY INSIGHT

Will TOP Take Off?

· B Y · S T A N · K O L O D Z I E J ·

Since Boeing Co. of Seattle began promoting its Technical and Office Protocol (TOP) networking standard last year, it has been struggling to be more than a voice in the wilderness but with mixed results.

Whatever publicity TOP has garnered to date has been caught on the rebound from General Motors Corp., which has been making the manufacturing industry and press sit up and take notice of its own Manufacturing Automation Protocol (MAP) networking standard. TOP has been riding the publicity coattails of GM for two good reasons.

The first reason is technical. Both MAP and TOP are based on the seven-layer Open Systems Interconnect (OSI) networking model sanctioned by the Geneva-based International Standards Organization (ISO). In fact, of the seven layers in the OSI model, TOP and MAP diverge in only the first and seventh layers. (The seventh layer, dealing with actual applications, is still unformulated.) Otherwise, they are compatible.

The other reason is a lack of marketing punch. Though Boeing is a large, high-profile manufacturer and prolific user of computers, it still cannot exact the kind of commitments from computer vendors that a company like GM can exact, especially in light of GM's long-range intention to spend $5 billion on upgrading companywide computer operations.

Further weakening Boeing's position is the makeup of the office market. The U.S. manufacturing industry, because of its relatively recent foray into plant-based computers, is still open territory for computer vendors to grab substantial market shares. Unlike office computing where IBM holds sway, no single vendor or group of vendors has gained enough market share in the manufacturing industries to be able to impose proprietary, de facto standards.

This has left room for a big company like GM to wield clout, creating enough interest and momentum around MAP and undermining any efforts from computer and communications vendors to try and create other de facto networking standards.

The office market, where TOP is aimed, however, is another story. IBM's monolithic presence (and brand name) is everywhere. Of more direct concern for Boeing, however, is the growing pervasiveness of IBM's Systems Network Architecture (SNA), IBM's major way of tying their machines together in the office.

Stacked up beside SNA, Boeing's TOP seems hopelessly outmatched. Against the estimated 20,000 SNA installations in the U.S., TOP to date can boast of none outside Boeing itself. In fact, most of those vendors that have promised future products under the TOP standard are themselves using SNA in-house. SNA and TOP are further kept apart by the fact that both models are incompatible at most levels of connectivity.

Despite the temptation to position TOP and SNA as bitter rivals in office networking, the more likely play of events will see them coexisting uneasily with each other, used separately to handle specific applications. Also, through gateways and interfaces, SNA and TOP will overlap to form hybrid networks.

Boeing itself certainly has no illusions as to how far TOP can travel in an IBM universe. "We're not daydreaming," said Laurie Bride, manager of advanced data communications technology at Boeing Computer Services Co. in Bellevue, Wash. "We have to live with IBM, but if we can also create enough user interest in the OSI standard and (consequently) in TOP, IBM is going to have to include us [TOP] in their world."

Bride also pointed out what she thought was a high card in TOP's hand: The fact that TOP is geared more toward the distributed processing environment, as opposed to what she termed as IBM's traditional centralized, mainframe processing slant toward centralized, mainframe processing sites. "We're starting at the workstation and minicomputer level and tying in mainframes. Going from the bottom up, we understand the need for more interactive processing, not just linking dumb terminals to mainframes," Bride explained.

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For TOP to make any sort of impact in office networking, though, most industry observers agree it will have to stay close and take advantage of the momentum gaining around MAP. For one thing, those corporate users installing MAP networks will be able to link them to OSI-based office networks like TOP with few problems. The only hurdle at this stage will be the transport mechanism used at the first level. At this level, MAP has opted for a broadband cable using IEEE 802.4 token-passing technology, while TOP uses the IEEE 802.3, a carrier-sense multiple access with collision detection (CSMA/CD) baseband bus standard.

The difference in network transmission techniques results from the different requirements in the TOP and MAP processing environments. In manufacturing, fast throughput for many operations

such as process control is essential. CSMA/CD technology is not as efficient a method as token passing for handling large, real-time data processing. Also, broadband, with its capability of being split into numerous frequency channels, can accommodate more data capacity and speed than baseband and is better prepared to handle different types of media such as video and graphics.

Bride said that network transmission speed is not really the big issue right now. That distinction, Bride maintained, rests with the current lack of functions available for the TOP network. That problem is being addressed at the seventh layer, the level dealing with applications.

Work within TOP is under way on proposed standards such as FTAM for the exchange of electronic mail, text and graphics. This work is being handled in

tandem with the National Bureau of Standards and other work is under way to coordinate MAP, TOP and OSI within existing standards bodies. For example, the Office Document Architecture (ODA) standard has been approved by the European Computer Manufacturers Association and is now serving as the basis for an ISO standard that could eventually find its way into the TOP format.

Against this background stands the Industrial Technology Institute (ITI), a facility in Ann Arbor, Mich., entrusted with the task of providing and certification for vendors coming out with MAP- and TOP-based products. Though ITI has already begun testing MAP products, it will not be providing the same services for TOP vendors

until later this year, when more TOP products are expected to start appearing on the market. When TOP testing begins, the ITI certification will act as an important product channel for the networking industry.

While IBM has given its nod to the OSI standard, Big Blue has also been aggressively attempting to forestall more criticism of its present inability to network SNA users into some of IBM's other operating environments such as CICS and the IMS data base management system.

Within SNA, for example, IBM is ahead of schedule in offering peer-to-peer communications ability between IBM Personal Computers and minicomputers through its LU 6.2 and PU 2.1 networking protocols. IBM is also tying in its Document Interchange Architecture (DIA) and Document Content Architecture (DCA) formats for electronic messaging. This gives IBM users the ability to transfer files directly from one SNA workstation to another without the direc-

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> *For TOP to make an impact in office networking, it will have to stay close and take advantage of the momentum gaining around MAP.*

tion of a cluster controller or file server.

IBM is also expected to announce an interface between its Token-Ring network and SNA. Beyond this, many industry observers see 1987 as the year IBM begins tying its other mainframe operating system environments directly with SNA. Such communications universally within the SNA world is expected to undermine a large part of the appeal that OSI has gained in the U.S. from IBM users unhappy with the company's history of building proprietary blocks of processing environments unable to talk to each other.

In spite of this, TOP will probably find its market niche within what Hal Folts, president of Omnicom, Inc., a consulting firm in Vienna, Va., termed "communities of interest": those companies such as airlines, power utilities and manufacturing concerns requiring contained, specialized applications and where a de facto industry standard such as SNA would lose much of its appeal.

"Airline reservations systems, for example, are not sold on the premise that they will also be compatible with an outside bank's system or any other system for that matter," according to Folts. "The same is true with manufacturing industries. Their requirements are specific and geographically limited within the company.

"MAP will be the standard on the manufacturing floor. As there is a need to link data from the floor into the office, it makes sense to plug a TOP network into-

TECHNOLOGY INSIGHT

the existing MAP network because they are basically compatible, rather than trying to graft SNA onto MAP, layer by layer," Folts concluded.

At this stage, TOP is being driven by various user/vendor groups. These groups have a vested interest in having an alternative to SNA available in manufacturing, a point borne out by Charles Gardner, corporate systems standards coordinator of information systems at Eastman Kodak Co. in Rochester, N.Y.

Gardner explained that TOP working groups handle separate questions dealing with the various layers of the OSI model. Different vendors are sponsoring work at each level: Lockheed Corp. has graphics, McDonnell Douglas Corp. sponsors work on the product data exchange syntax, Boeing has virtual terminal messaging, and Motorola, Inc. handles work on the physical layer links. All of these vendor-supported groups have also been working hard to get MAP moving.

> **There's more discussion about TOP than actual product.**

to do is layer our software into TOP products when they become available."

IBM for its part is using its major presence in Europe as a testing ground for its commitment to OSI. IBM enjoys a much higher profile in Europe because of its backing by the European Community and the willingness of the various national governments to push for standards that would cut across regional market limitations and create a uniform front against IBM. European vendors are quickly coalescing around OSI and forcing IBM into scrambling to produce OSI products

to prevent being frozen out of this potentially huge market. Many analysts predict IBM will create its first OSI products in Europe then import them into the U.S. market as OSI comes up to speed.

In the meantime, IBM recently joined the Corporation for Open Systems (COS), a North American organization composed of several leading computer manufacturers and with a mandate to help quicken the pace with which communications between equipment from various vendors can be connected in the same office.

Bride does not see IBM's COS affili-

ation as merely another cosmetic move by the company to keep its options open both in SNA and OSI. "Membership in COS is expensive and ties up some key personnel from member companies," she explained. "The fact that COS already has $6 million in the coffer and is well on the way to its $10 million goal of 1987 says the group means business."

Alex Nedzel, managing associate at Index Systems, Inc., in Cambridge, Mass., said he thinks OSI will be competitive in the North American market in five to 10 years, but that doesn't necessarily include TOP. "SNA and the DIA/DCA architectures will dominate the U.S. market, but TOP won't go away. It'll find its place beside SNA and MAP."

Kolodziej is a senior writer at Computerworld Focus.

TOP's affiliation with MAP has also become tighter with the recent decision to consolidate MAP and TOP meetings under one roof, the first of which is scheduled this month. The Society of Manufacturing Engineers (SME) is now combining TOP and MAP memberships under single-membership fees. Though MAP and TOP have separate users groups, they now have a common steering committee.

If anything, there probably will not be a single OSI implementation existing in most TOP installations but rather a number of hybrid products integrating SNA and OSI models and aimed at the specialized applications in the communities of interest mentioned earlier. "IBM might say, 'We'll take three of the layers of OSI, mix in some SNA layers for certain applications and tie it all together.' We'll see more customization like that," Omnicom's Folts said.

For now, there's more discussion about TOP than actual product. One of the few firms that has actually come out with a TOP product is Charles River Data Systems, Inc. of Framingham, Mass. In 1985, the company came out with a physical link router that connected MAP and TOP networks and is set to introduce a dedicated TOP software tool this summer. Reversing the usual trend, Charles River Data Systems started with TOP and began to move "working its way backwards" into MAP, according to Eric Spiewak, the company's director of networking.

Spiewak downplays TOP's overall reliance on GM and MAP. "Boeing probably has the biggest installed computer base in the U.S. outside the federal government," Spiewak explained. "What they want to put across is the idea that OSI and TOP have legitimate places in the office."

David Sohm, vice-president of marketing at Ask Computer Systems, of Los Altos, Calif., said his company is monitoring TOP developments, keeping track of the market and receiving TOP committee literature through SME memberships. For the past several years, Ask Computer Systems has marketed a manufacturing resource planning system called Manman, composed of a number of separate software modules.

"Our software fits in the center of the manufacturing process, between the shop floor and the financial applications," Sohm explained. "What we'd like

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Predicting Trends For '86

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· B Y · A L A N · P A L L E R ·

The winds of change are sweeping through the entire computer industry, and the computer graphics arena will not remain immune.

Nearly two-thirds of personal computer and minicomputer graphics software vendors will disappear by the end of 1986, most ink-jet printer vendors will turn to other technologies, and manufacturers of the venerable digital plotter will begin to look to other, faster technologies for growth.

As choices begin to narrow, end users and MIS are breathing a sigh of relief. They no longer fear that the products they buy will soon become obsolete. In addition, most trends shaping computer graphics are no longer independent of the trends shaping other areas of information processing. Communications, cooperative processing, integrated text, data and graphics, standards and the concerns of new users now affect graphics just as much as they affect other software and hardware decisions.

The following outline illuminates the trends that will be important to computer graphics users during 1986 and describes what users can do to anticipate the trends and take advantage of the opportunities they offer.

■ Graphics resolution in displays will improve. The screens on PCs and terminals used to preview graphics are getting better, allowing for more detailed graphics with more varied lettering to be displayed clearly. The biggest change will be seen in PC displays as most PC buyers begin to acquire the IBM Enhanced Graphics Adapter (EGA) expansion card, which offers a much greater resolution than the standard IBM color card. Third-party vendors of add-on equipment will also announce EGA-compatible display controllers. By year-end 1986, EGA compatibility will be the standard for PC graphics.

In the graphics terminal market, IBM 3179 graphics terminals, Tektronix, Inc. 4100 series terminals and Digital Equipment Corp. VT241 terminals will continue to be the most popular machines.

However, they will get competition from IBM and compatible PCs with EGA cards. The PC is beginning to be perceived as the graphics terminal of the future because it can serve either as a stand-alone micro or, with a higher resolution graphics card, as a graphics terminal.

Also during 1986, very high-resolution color graphics terminals and PC expansion cards will become available, offering up to 2,000 lines of resolution on the screen. The higher prices of such products will limit their use to applications such as computer-aided design and computer-assisted publishing where precise visualization is worth the extra cost.

■ Lasers and thermal color printers with more speed, better quality and lower costs will be available. The traditional graphics hard-copy systems, plotters and matrix printers raise barriers to effective use of graphics: They are either too slow or their output resolution is too low. Lasers and thermal transfer printers solve those problems. Lasers offer 300 dot/in. black-and-white charts at rates ranging from one to 100 chart/min. New thermal transfer printers provide 200, 300 or 400 dot/in. color charts or overhead transparencies at the rate of one per minute. These higher speeds with good quality make high-value graphics applications feasible as long as the graphics printers are connected correctly to computer systems — namely, as shared printers on a network.

During 1986, users will be buying a large number of laser printers and thermal transfer printers. The cost of these graphics printers dictates that they be connected to networks rather than individually attached to every workstation. PC networks, minicomputer networks and mainframe networks will all be used to give both PC and terminal users access to graphics printers.

By mid-1986, the most visible indication of an advanced, cost-effective computer graphics hardware installation will be a laser printer connected to a network. In organizations implementing this configuration, every user of a terminal or communicating PC will

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be able to get high-quality charts simply by asking for them on the keyboard on the desk

For color charting, users will continue to purchase small, inexpensive digital plotters in large numbers as personal graphics devices; however, economic growth in the plotter market has ended. Thermal transfer machines are already eroding the market for larger, higher cost plotters. Furthermore, firms will announce late in 1986 new color laser printers offering even higher speeds than those of thermal transfer printers. However, users who purchase thermal color transfer printers during 1986 will not be embarrassed by the color laser announcements. Thermal transfer printers will cost about $6,900 compared with a cost of more than $15,000 for color laser printers.

■ **New graphics workstations will bring mainframe power to the desktops of professionals.** This year, a large number of powerful personal workstations will be purchased by professionals whose work requires software that has traditionally run only on minis and mainframes. These personal workstations use Unix, VM and VMS, which are the operating systems under which important applications software packages already operate.

The workstations will allow users to off-load those applications to desktop machines that cost $12,000 to $25,000. For users whose current monthly mainframe or minicomputer time-sharing bills exceed $500 or $600, the workstations offer two- to four-year paybacks and promise extensive additional computing at no additional cost.

The machines in this category include Sun Microsystems, Inc. and Apollo Computer, Inc. units and will soon include similarly powerful machines from AT&T, IBM and DEC. Entry of big-name players, especially IBM, will induce large corporations to acquire significant numbers of these workstations. Many will become network servers for PC networks, and many more will become personal workstations.

Cooperative Processing Trend

■ **Microcomputer-mainframe cooperation will bring powerful graphics to PC users.** Cooperative processing is an emerging trend in the graphics field. One area in which it is valuable is in helping PC users get access to graphics hardware such as laser printers, film recorders and thermal transfer printers. Cooperative processing makes it possible for users of PC packages such as Lotus Development Corp.'s 1-2-3 to get very high-quality graphics output without buying individual graphics plotters or printers and without waiting for those printers to work.

Here is how cooperative graphics processing works: The 1-2-3 user previews a chart in 1-2-3. When the data and chart look right, the user invokes a function that translates the 1-2-3 WKS file into a compact Iasco Graphics, Inc. Tell-A-Graf command file, for instance. That compact command file is transferred to a mainframe, mini or workstation where the software and high-quality graphics hardcopy devices reside. Charts, overheads or 35mm slides are produced automatically and delivered back to the 1-2-3 user. In essence, the mainframe or minicomputer has become a network peripheral to the personal computer.

Demands for improved productivity are driving this trend. The high cost of fast graphics output equipment relegates most PC users to low-speed plotters. Those users do not have time to wait for the plotter so they use charts sparingly, even though they would like to produce many more charts. Cooperative processing allows them to produce all the charts they need without wasting time.

■ **Cooperation among proprietary software packages will improve access to data and the payoff from graphics.** The biggest barrier to high payoff graphics applications is the lack of high-speed, high-quality graphics hard-copy equipment. The second biggest barrier is the difficulty of getting the right data into the right chart. Data base packages and fourth-generation languages have excellent access to data and analytical functions, but, for the most part, their graphics components lack capabilities that are essential.

In the past, the latter barrier was removed circuitously by forcing the data reporting packages to generate reports in

paring budget with actual spending, a variance bar chart and a table providing detailed data. Chart books offer 20:1 productivity improvements. Without the management chart book, users would have to spend several hours making that chart with a, they spend 10 minutes.

■ **Integrated text and graphics will change the look of internal documents.** The combination of higher resolution printer, higher resolution screens and upgraded word processing software is changing the way memos and reports are produced. Most word processing programs announced in 1986 will allow diagrams and charts to be embedded in the page. They will also include many more text fonts and sizes to facilitate publication-like appearances

Although complete computer-aided publishing packages will be used for some of the integration, a much larger user base will develop when new versions of the most popular word processing packages — Multimate International Corp.'s Multimate, Micropro International Corp.'s Wordstar, IBM's Displaywrite

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formats that powerful graphics packages could read. During 1986, a new solution will emerge in which more effective graphics software operates as an embedded function inside the reporting software.

Software Trends

■ **Packaged solutions will bring in a large number of new users.** Graphics software vendors are delivering a new class of product, called application-intelligent software, that offers users immediate improvements in productivity. Application-intelligent software combines chart-making tools with a knowledge base about what types of charts users need. The software releases the user from the job of trying to force a general-purpose graphics package to create a special-purpose chart when that special-purpose chart is one commonly needed by many users.

Three popular examples are maps, project management Gantt charts and financial analysis charts.

Project management applications will affect large numbers of graphics users because nearly every organization manages projects. Macproject, the project management application on the Apple Computer, Inc. Macintosh, is one of the most common uses of that computer. Similarly, Iasco's Tell-A-Plan project management graphics software for IBM mainframes and DEC VAXs is used more often than general-purpose graphics tools in several organizations even though the general-purpose tools have been available much longer.

The largest impact of graphics applications during 1986 will be in the financial management area. New management chart books that provide instant complete financial management charts are coming on the market. A single compound chart in the chart book, for example, includes a time series line chart com-

and Satellite Software International's Word Perfect — are announced with built-in text and graphics integration.

■ **New graphics user interfaces will prosper when they are free.** Microsoft Corp.'s Windows and Digital Research, Inc.'s Graphics Environment Manager (GEM) claim to offer Macintosh-like ease of use on IBM-compatible PCs. The marketplace has shown that pop-up menus, graphics symbols, windows and mouse input are all valuable capabilities, but they will not be bought in volume until they are embedded in application packages and their price is included in the application package price.

The trend for graphics user interfaces during 1986 will be toward OEM contracts. GEM and Windows will compete against each other on price for OEM contracts with software and hardware vendors that want to make their software or hardware products stand out as modern looking.

Beyond 1986, Microsoft's graphics user interface capabilities are likely to become an integrated part of its own MS-DOS operating system and will be included in OEM sales of future versions of MS-DOS.

Once graphics capabilities are built into the operating system, by Microsoft or IBM, application software vendors will take advantage of those capabilities, and many users of PC-compatible computers will begin to use them.

■ **New training programs begin to improve the effectiveness of graphics users.** In the past, traditional training programs in computer graphics focused on how to use the hardware and software. Organizations rapidly discovered that managers who knew what chart they should make were far more productive users of graphics than were people who had no such training. During 1986, dox-

ens of large organizations will hold in-house classes to describe how to choose the right chart.

■ **Executive graphics decision support systems will spread.** The final trend in graphics is toward the rapid spread of senior management information systems that use graphics. These systems are distinguished by their unique delivery vehicles rather than by the charts they include. Delivery options include pocket chart books, full-size chart books, graphics terminals, PCs and large-screen projectors.

Pocket chart books may include as many as 100 pages of charts and tables with two or three charts on every page. They fit in the breast pocket of a suit and are especially well liked by mobile executives who need answers at the tip of their fingers.

PC delivery of charts also is becoming popular. At the U.S. Air Force Electronic Systems Division, for example, a system being used by a commander will soon be extended to more than 1,000 PCs. Every PC will get access to central libraries of management charts. The Air Force system, developed by Booz-Allen & Hamilton, Inc., uses VAX minicomputers to gather, analyze and chart key management data. It downloads the charts to PCs that can each store up to 1,000 charts on a hard disk. Executives and managers see a menu of available charts on their PC screens and can view any of the charts in less than 10 seconds. High-resolution graphics screens and large-screen projectors are added when the system is to be used for briefings. Ink-jet and thermal transfer printers are available for hard copy.

The bottom line is that the aforementioned graphics trends are part of an overall trend in computer graphics: the shift toward high payoff applications. MIS is demanding that graphics affect the bottom line by reducing manpower requirements, saving money, improving product quality or increasing sales. Managers are pressing their information center staff and application developers to focus on applications that meet this requirement.

These applications have had a common characteristic. They involve the creation of a large number of charts. The growth in high-volume charting helps explain the trend away from plotters and toward fast laser printers and thermal transfer printers. This growth also helps support the need for cooperation between data reporting packages and graphics packages because manual data entry is tedious and error prone when large numbers of charts are needed. It also explains the need for micro-mainframe links required to give PC users access to higher volume hard-copy devices and access to the better quality software that resides only on minis and mainframes. And this growth supports the need for graphics workstations because high-volume charting applications generate large time-sharing bills.

Finally, demand for high payoff applications explains the trend toward graphics application software packages. Graphics application software facilitates prototyping and experimentation, which are the prerequisites of successful computer applications. □

Getting The Most For Your Dollar

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Increased productivity through graphics clearly is achievable. Unfortunately, the decision-making process, buying guidelines, implementation and application integration of graphics are related in such a way that an incorrect decision in one area can have catastrophic results in the others.

As with any computer-based productivity tool, getting people to use software is the most significant hurdle to overcome before addressing productivity enhancements. It is imperative to secure that the basic building blocks are in place.

The four primary concerns in ensuring the ease and availability of the appropriate tools and resources for a business graphics investment are as follows:

• Implementing a budgeting and justification process.
• Choosing the right software.
• Choosing the right hardware.
• Getting the software and hardware to work together.

The budgeting and justifications process. The cost of graphics hardware and software has

plummeted. Less than seven years ago a high-resolution film recorder for storing computer graphics on 35mm slides cost $200,000. Today a film recorder of comparable quality costs less than $10,000. If a user is willing to sacrifice half the resolution and produce slides with roughly the acuity of the human eye, a slide recorder can be found for $7,000. But many companies and individuals investing in computer graphics do not fully anticipate the hidden cost. These costs cover such things as training, support, printer and plotter supplies, documentation, graphics hardware upgrades, software additions and general computer resources costs. To some, these additional unexpected expenses make that initial graphics investment lose all significance. However, these are realistic productivity expenses that can be managed and justified.

Figure 1, page 39, is a partial list of fixed and variable costs associated with a computer graphics investment. Associated with each line item is an approximate expense level that can be used as a

reference point. Each item is specific to each organization and need, but the list demonstrates some of the thinking and planning that is required in the justification process.

The costs in Figure 1 are not inclusive but rather areas of consideration. Once a rough handle on the cost of computer graphics is available, the productivity gains should be evaluated. Gains are more difficult to measure than costs because expenses appear on the books fairly soon after a decision is made. Productivity gains, on the other hand, may not be felt for a number of months. It is important to look at short-term productivity gains because the ineffective use of computer graphics from the outset may never allow you to achieve your objectives in the long term.

An outline of some productivity gains that might be expected in a large organization or department is shown in Figure 2, page 39. Again, these need to be modified for specific requirements.

A small department or organization could realistically experi-

ence a cost or productivity savings at the management level of about $50,000 a year.

Choosing the right software. When considering investing in computer graphics, many buyers initially look at hardware requirements and then try to find software to complement these requirements. Because hardware is more tangible than software, there is a natural gravitation (and ease of selection and justification) toward specifying the hardware first. Do not fall into this trap. Software offers solutions and solves problems; hardware is the medium through which the user takes advantage of the solution.

Choosing areas where graphics can have a major impact on productivity can help drive the justification process. The most obvious areas of impact are those in which graphics are being produced by hand. These areas include engineering, research and drafting as well as graphics arts departments.

When the reasons for choosing a certain graphics option are considered, cost savings and expenses can be evaluated. Again, do not be

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fooled by looking merely at dollar figures. A project selected in being highly leveraged through computer graphics might prove a failure due to poor corporate visibility, lack of user support or the amount of time it takes for it to come up to speed.

The software selected can be easily modified after the work that is currently being done by hand. Users can specify features they require to the software buyer who then can begin the selec-

tion and evaluation process.

Another area where graphics can impact productivity is within a department that is not using graphics at all. However, justifying the replacement of handdrawn graphics with computerdrawn ones through a simple analysis will not easily work with new users.

Each group should consider the following ways in which graphics can have an impact:

• Shortening the process

from data gathering to information understanding.

• Expediting trend spotting
• Aiding the training process for new employees.

• Monitoring production output or manufacturing quality control.

• Seeing the results of "what if" questions.

Again, it is important to select those areas where graphics will have more than just a momentary impact. Select graphics

projects that have high visibility and strong user support.

Specifying software for new applications where graphics is currently not used is more difficult than replacing hand-drawn graphics with computer graphics. The users need to be able to articulate those processes that would be optimized by graphics.

With an understanding of these general requirements, a set of software features can be created. Defining the scope of

the software offering from this bottom-up approach always brings out the same question: "What if I don't find one software package that handles all my requirements?"

This question can be answered empirically with two steps. The first is to select two or three software products that come close to solving your needs. The second step is to create a list of features that are not supported by all the selected software products but are supported by at least one, ignoring all features that are satisfied by all the selected software. This list should be kept short because the subsequent ranking of the features grows as the square of the number of features being ranked.

Compare feature one with feature two and determine which of the two is the more important. Put a check mark next to that feature. Do the same with feature one and feature three. Continue the process until feature one has been compared against all features.

Repeat the process with feature two. Compare it with feature three and place a check mark next to the most important. When the entire list has been exhausted, add up the check marks for each feature. All features might not be offered by the winner, but the most important ones will be.

A s a last note when selecting software, do not ignore the subtle make-orbreak issues. These include "nonfeature" obstacles that can slow down or stop the productive use of your investment. The following are of specific concern:

• Who installs the software?
• What training is required, and who will do it?
• When will the software be updated, and who reinstalls it?
• How does the software support graphics devices?
• How do I support new devices?
• What upgrade path do I have available when our needs grow?
• Is the software portable so it can be moved to a new computer?

Selecting the right hardware is quite often the easiest part of the graphics investment. This double-headed coin covers the computing requirements for graphics as well as the peripheral requirements. Assume that the decision maker has already selected a computer. Nonetheless, application migration might require that the software and hardware decisions take into account issues of portability, networking and newer operating environments such as Unix.

Putting these aside, choosing the right hardware devices plays an important role in graphics productivity. The first step is

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deciding which of two graphics categories your application requires. The first category is production charting and the second is ad hoc charting. Production charting is predominantly hard copy oriented.

The regular mass production of charts or unattended graphics falls into this category. A data base that uses a graphics report writer to produce chart output instead of data listings is one example and nontechnical computer users who have a simple one-button graphics system that produces hassle-free output is another.

Ad hoc charting is also called demand charting. Users who want spontaneously to visualize their data or produce one-of-a-kind originals perform ad hoc charting.

General classes of charts that reflect the requirements of the application and the user can be selected. Different manufacturers can be chosen based on product breadth, availability, cost, complexity of operation, software device driver requirements and vendor relationship.

The nondestructive obstacles already mentioned in the software selection section are also applicable to the hardware decision.

The integration process of connecting the data gathering and manipulation software to the graphics software to the hardware is the next significant barrier to overcome. Since this is the single path of information flow. if there is one bottleneck or problem, the entire process suffers.

By choosing the software first, the integration of graphics and the data source should have already been considered and resolved. Graphics programs should not be considered in a void but rather as part of the entire information processing environment.

If you are dealing with the IBM world of EBCDIC, consider the few devices that appear as native peripherals. They include the following:
• IBM 3279 and other IBM graphics displays and printers.
• Tektronix. Inc. CX4100 series for IBM computers.
• Nicolet Zeta Corp. graphics plotters and cameras with a protocol converter.

Though other devices might be connected with special hardware or modifications to the operating system, this path is not for the inexperienced. War stories abound about the inability to transmit all the required graphics control characters and commands on IBM computers. Users talk about charts with stray vectors caused by improperly converted control characters.

For non-EBCDIC machines (which are almost all other computers), communication issues are almost nonexistent. The most serious concern turns toward which graphics peripherals are supported by the selected software.

Try not to have the hardware decision forced by the software's device support. By decoupling the hardware and software decisions, you have plenty of flexibility for future device selection and upgrades. This can be accomplished by two mechanisms. The first is to use a vendor that utilizes either pure Tektronix or pure HP Graphics Language protocols. The second is to choose a software manufacturer that gives you full control over device interfaces and drivers.

By choosing de facto standard protocols, you have the option of using major manufacturer's devices or other products that emulate the de facto standard technology.

Though this is not a foolproof option, it heavily weights the choice in the direction of success. Specifically, emulators may replicate the formal specifications of the de facto standard but fail to replicate the undocumented subtleties. For example, intercharacter spacing (not documented) might differ from one terminal to another just enough so that the last character in a long title might be clipped off the page.

The old adage of 'you get what you pay for' is almost a law when it comes to graphics hardware. Consider more than cost when investing in peripherals. Consider support, installation, ease of use, maintenance, compatibility and functionality.

Have your hardware and software vendors talk to one another to determine who is responsible for what and how they both can help you get the hardware and software to work together.

With all the bridges in place, there is still no guarantee that the use of graphics will be an immediate success. One bad experience with graphics can keep a user from trying it again.

A successful graphics implementation should follow the same scenario. The

Fixed	Cost
General-purpose software for small computers	< $1,000
Specific application on mainframe computer	> $50,000
35mm camera system	< $10,000
Full graphics laser printer	< $10,000
Commercial-quality dot matrix printer	< $6,000
Medium-resolution color CRT	< $2,500
Alphanumeric black-and-white CRT	< $1,500
Alphanumeric CRT with graphics characters	< $600
Ongoing annual maintenance	10% of purchase price
Device drivers	Should be free
Software and hardware installation	Self-installing
Variable	
Software training	$250 per person
User support	Split between vendor and buyer
Computer resources	See data processing manager
Materials	Minimal
Application integration	$10 per line of code

Figure 1. Some Fixed And Variable Costs For Computer Graphics Investments

expert. Remember that he is an expert already re regard to his current application and job requirement. Graphics will simply make his job easier and more productive.

Graphics should be an extension of the existing computing environment and should be a logical and intuitive enhance-

Visuals cut meeting times by 30% (Wharton Study)

Average manager's salary	$60,000 per year
Overhead factor	×1.2
Number of hours in year	1,920
Time savings of 30%	0.30
Hours spent in meetings	350 per year
Savings per person = $60,000 · 1.2 / 1,920 · 0.30 · 350	= $3,937.50
Average of five people per meeting saves	$20,000

Twice the comprehension with visuals (Wharton Study)

Decision maker's time spent in analysis	25%
Savings in understanding = $60,000 · 1.2 · 12.5% =	$9,000

Cost of presentation slides drops by factor of 13

Cost per slide by outside vendor	$50
Average manager's salary	$60,000 per year
Overhead factor	×1.2
Number of hours in year	1,920
Time to design one slide	5 min or 0.083 hr
Cost for 36 exposure roll of film	$6
Cost of 3-hour developing	$7
In-house slide cost	
$60,000 · 1.2 / 1,920 · 0.083 + ($16 + $7) / 36 =	$3.76
Savings at 12 rolls per year = ($50 - $3.76) · 36 · 12 =	$19,975.68

Electronic mailing of charts cuts down on paper handling

Copying and distributing reports	$4 per report
Number of reports manager sees per day	1
Handling cost per year = $4 · 5 · 4 · 12 =	$960

Figure 2. Some Expected Productivity Gains in Large Organizations

votal point is convincing someone to try graphics and then act as the internal promoter.

The first step is to find a highly visible application that when shown to be a success, will broadcast the success for you. This application should have users that are not adverse to change and willing to invest their personal time to learn a new system. Likely targets might be areas where a lot of paperwork can be replaced or where a lot of data needs to be analyzed and condensed into more workable groups.

The second step is to ensure that the user is protected from hardware, communications or operating system issues that are not important to his application. Do not try to turn the user into a graphics

ment to application software that already is familiar to the user. If the user utilizes the system editor for data entry in one application, it also should be used for the chart application. If the user is used to just typing in PRINT to get a listing of data, he should be able to type in CHART to get a graph.

Do a lot of hand-holding. Initial training is a requirement and should be budgeted.

The user should be educated on both the use and production of graphics. It is not enough to know that a certain set of commands will product a chart. Remember that graphics is a means of increasing understanding and expediting communication, and the user needs to be trained on what charts best show his data and

how to select the proper layout to express his ideas. Offering graphics capabilities without the appropriate training will have a result similar to giving an expensive camera to someone who has never before taken a picture. Anyone can push a button, but this does not mean success or productivity.

Assistance will also be offered in the form of on-line help, a function which allows the user to get as much help as he needs but on an on-demand basis. Why learn about logarithmic charts if they are never used.

Improving productivity means making hard things easy. Those things that were easy should be trivial. With graphics. one sure way to success and productivity is to create application-specific chart stencils. These chart stencils are templates that have been predesigned to fit the needs of the user and application best. The stencils can be placed in a chart book for reference.

Producing meaningful information requires no more than selecting the proper stencil, adding the appropriate data and producing a hard copy. This three-step process can be done in less than a minute. That is productivity!

Take the graphics successes and try to quantify the benefits. Look for trends as well as areas for improvements. Promote both word of mouth and formal presentations spreading the word. Refine those areas that offer a clear and successful path to graphics productivity and produce a department or company guide that can be used by others to define their graphics needs.

Computer graphics has been around for a long time. Bypass areas that have been known to fail (for example. real-time graphics on a mainframe supporting 200 users) and focus on the proven. Use your vendors.

Make them be responsible for their hardware or software and have them prove to you that their systems are installed and working properly.

Lastly. make sure that both you and your users have realistic expectations Set goals that can be achieved. Once the basics are in place and people are committed to the productivity offered by graphics, you will be able to extend the proven value of graphics onto other areas with even greater productivity. ▪

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Evaluating Your Graphics Needs

· B Y · G A R Y · L A R O F F ·

Rapid advances in computer graphics output device technology have produced inconsistent reactions by organizations using graphics. Most organizations have moved forward, using available technology, learning from it and adopting the high payoff applications. Others have delayed making further investments, waiting for the day when they hope choices are fewer and more certain. It may be a long wait.

A good guide when shopping for peripherals is match the medium (slide, transparency, paper) to the application, then match the graphics device to the medium. But more than a maxim is required to make informed decisions about graphics devices. The base level of knowledge stems from the intended graphics application: analysis, presentation or publication. The variety of media suited to these applications is divided into soft copy on display screens and hard copy on flip charts, transparencies and slides. Once you understand the graphics applications, arming yourself with some knowledge about devices will aid your hunt for more productive peripherals.

Graphics terminals are the most popular devices for entering textual and graphics data commands, interacting with graphic development and previewing graphics. The terminal is truly one of a kind. Terminals let the user design charts and graphs economically before expending time, effort and expense generating hard copy.

Business and management graphics applications usually rely upon desktop, medium-performance terminals using raster-refresh technology. Check out the following seven features in a raster refresh terminal: display refresh rate, resolution, screen size, number of colors, computer overhead, on-demand hard-copy capability and price.

• The display refresh rate is literally how fast the terminal screen is redrawn. The general rule has been for raster terminals to rewrite (or refresh) half the screen (every other line) every 1/60 of a second, therefore rewriting the entire screen every 1/30 of a second. This scheme is known as a 30Hz interlaced refresh mode. While this way is the least expensive one in which to design and build a raster refresh terminal, the result is screen flicker. The alternative is noninterlaced mode, which rewrites the entire display at one time. When noninterlaced displays are refreshed at a frequency over 50Hz, the display is rock solid without a hint of flicker. When possible, use a noninterlaced display. For example, the newer Tektronix, Inc. 4100 series have noninterlaced displays, but the older 4020 series units do not. The newer IBM 3179 Model G and 3270-PC/G series have noninterlaced displays, but the older Model 3279 does not. Almost every PC color monitor is interlaced and presents potential eye-fatiguing flicker problems. A noninterlaced color display may be well worth the extra $2,000.

• Resolution is essentially the number of rows and columns of dots (called pixels for picture elements) on the terminal screen. For most people, the minimum resolution that seems comfortable is 640 by 480 pixels on a 15-in. screen and 1,024 by 780 pixels on a 19-in. screen. For noninterlaced, 13-in. displays such as that found on the Tektronix 4105, a lower resolution such as 480 by 360 pixels is acceptable for all day viewing. The price differential for increased resolution is minor and reasonable.

• Screen size falls into two varieties: either about 13 or 14 in. or about 19 in. Screens under 12 in. are a little small, and 25-in. screens may be difficult to look at. Higher resolution helps viewers on screens larger than 17 in. The logic is simple: If your home television screen is too large, you simply sit back. Moving more than an arm's length from a terminal screen too large for the resolution, however, is impractical.

• The number of colors a terminal inherently supports is critical. Large palettes supply the potential to produce shaded backgrounds and multiple shades of a given color. The number of simultaneously viewable colors specifies how many of the shades can be displayed at one time. Some PCs and low-end terminals support

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only three or four colors on the screen at one time. A realistic minimum specification for business graphics applications is eight simultaneously viewable pure colors from a palette of 64. Certain terminals support 16 simultaneously viewable colors out of a palette of 4,096. High-end, color stand-alone terminals include the Tektronix 4125 and the Advanced Electronics Design, Inc. 1024, which support 256 simultaneous colors out of a palette of about 16.5 million; and Seiko Instruments U.S.A., Inc. 2414 supporting 1,024 out of a 32,768-color palette.

• The computer overhead required by a terminal should be minimized. Local terminal intelligence and memory are smoothing out differences in terminals and generally producing graphics faster. The terminal should support the concept of "hardware characters" and polygon fill of any random shape without limit to the number of vectors and crossover points. The IBM 3279 Model 52, 3270-PC/G and 3270-PC/GX are more efficient than the older 3279. The Tektronix 4107 is somewhat more efficient and flexible than the previous Model 4027.

• An on-demand, hard-copy capability enables the user to press a key on the terminal keyboard and have a nearby hard-copy unit generate a full color copy of the screen. In the IBM Graphical Data Display Manager environment, a single terminal function key instructs mainframe-based software to produce a hard copy of the same graphics on a designated device. The demand hard-copy capability usually has no effect on the price of the terminal, and color copy units are now available for under $2,000. A few combinations include the IBM 3179 Model G with Model 3852 ink-jet plotter, the Seiko 1104 with Model CH-5201-B thermal transfer plotter, the Tektronix 4107 with Model 4695 ink-jet plotter; and the Tektronix 4111 with Model 4692 ink-jet plotter.

• Price is based on the preceding features. Higher resolution for a given screen size generally raises the terminal price. Passing other thresholds such as refresh rate and supporting some intelligent features such as zoom, pan, transforms and graphics input adds to cost.

Memory affects terminal price. For terminals that support the same number of colors on the screen, doubling the resolution on each axis multiplies the memory requirements by four; quadrupling the resolution multiplies memory requirements by 16. The minimal number of colors is two (black and white). For every twofold increase in the number of viewable colors you have to add yet another memory plane. Memory is not free but reasonable. Adding more power (speed), segment handling capability and local intelligence further adds to the price of a terminal with more capability.

High-quality color raster refresh terminals will rarely cost under $4,000. The IBM 3179 Model G, at $2,995, is a refreshing exception. Today $20,000 buys a stepped-down, very high-powered terminal. Adding options and memory planes can run its price up to $35,000.

The soft copy of the terminal display is ideal for perusing formats or making decisions based on previously stored graphics. Rarely is it the final output in business and data representation graphics applications. More often than not, the professional now places the choice of a hard-copy device over the choice of a terminal, and the copy device selected usually provides color output.

Five major variables are used to evaluate color or high-resolution monochromatic hard-copy units: image quality, resolution, speed, equipment cost and cost per copy.

Pen plotters, the workhorses of computer graphics, produce continuous lines and not the dot structure that results from the use of various raster print technologies. The newer pen plotters are intended for remote on-line use and a few are capable of continuous output on a number of different media.

Features that differentiate pen plotters are pen speed, pen acceleration, the

> *More often than not, the professional now places the choice of a hard-copy device over the choice of terminal, and the copy device selected usually provides color output.*

manner pens are changed, accuracy, continuous roll or sheet feed and price. The main performance difference usually comes down to speed.

Today, at the low price end ($599) is the Epson America, Inc. HI-80 with four pens and a 9 in./sec. pen speed. The fastest plotter in our discussion is the Hewlett-Packard Co. 7550A, which operates at 31.5 in./sec.) The Epson unit is positioned in the PC marketplace. Other low-end plotters include the Enter Computer, Inc. Sweet-P with one pen and 14 in./sec. ($695); the four-pen Houston Instruments 695 that operates at 4.2 in./sec. ($799); and the eight-pen Strobe M260 ($595). The undisputed high-volume leader in the PC arena has been the two-pen HP 7470A with a speed of 15 in./sec., an acceleration of 3G ($1,095). HP has recently replaced it with the new Colorpro Model 7440 with eight pens that are capped automatically to prevent dry out, a resolution of 0.001 in., speed of 15.7 in./sec. ($1,295).

Plotters supporting mainframe business and data presentation graphics offer slightly more performance and generally a slightly higher price tag than PC-attached devices. Acceleration data is vital considering that the plotter often is accelerating from zero (after changing pens or finishing a character). The HP 7475A is a six-pen, 15 in./sec. plotter with an acceleration of 2G and a reproducibility of 0.001 in. for $1,895. Nicolet Zeta's Zeta Sprint is a six-pen, 14 in./sec., 0.004-in. resolution plotter for $1,549. The Enter Sweet-P 600 Six-Shooter is a six-pen, 14 in./sec., 3G acceleration, 0.004-in. resolution plotter at the low price end of $1,095.

Slightly more expensive production plotters will run all day unattended because they change the paper themselves. The HP 7550 feeds itself sheets of paper, and Nicolet Zeta's Zeta-8 has a continuous scroll of paper. The Zeta 8 eight-pen carriage carries all eight pens simultaneously, which proves faster than most other methods of sending the pen carriage over to the side of the plotter to change pens. It runs at a very respectable 20 in./sec. with a somewhat unbelievable acceleration of 4G and produces plots with a resolution of 0.001 in. The speed, acceleration, eight-pen carriage, internal "smarts" — such as an internal circle generator — and high-volume continuous-roll paper make the Zeta 8 ideally

suited to a production graphics environment. It costs $5,950. The HP 7550A with eight pens, 31.5 in./sec. printing speed, high-speed acceleration, 0.001-in. resolution and a paper sheet feeder is $3,990.

Larger size plotters by Benson, Inc., Calcomp, HP, IBM, Nicolet and Tektronix are often supported by software that supports the smaller plotters.

Electrostatic printer plotters, a nonimpact technology, have traditionally produced black-and-white copies with images produced by electrodes placing charges on dielectric paper, which is then passed through a toner.

The major breakthrough for A- and B-size plotting has come with the new Versatec, Inc. Spectrum C2552 11-in.-wide color electrostatic plotter that costs $11,950. The unit produces black-and-white plots in 5 sec. for A size and 10 sec. for B size. Full color takes 72 sec. The flexibility of the plotter makes it ideal for unattended shared operation. It offers roll-fed paper with an automatic paper cutter and can switch automatically between color and black and white. A-size and B-size and text pages and graphics by remote control from the computer.

Thermal transfer plotters, also a nonimpact technology, are getting more reliable and less costly. Most use a low-melting-point wax transfer ink. The products hold the promise of simplicity, reliability, quietness and low-cost hardware.

Most of the newer thermal transfer plotters produce full color plots in about a minute with resolutions equal to or exceeding 200 dot/in. Representative U.S. products include the new 200 dot/in. Seiko CH-5300 series and the Toshiba Ltd. TN-5400, which produces 200 dot/in. A-size plots in a minute. Benson's CTP-10, which makes 300 dot/in. A- and B-size plots, costs $8,950, and Calcomp's Colormaster 5902 makes 200 dot/in. A-size plots and costs $4,490. Panasonic Co. has a 400 dot/in. thermal transfer plotter that is sold by Matrix Instruments, Inc. combined with their QVP rasterizer as the Model TT-200. Thermal transfer plotters are also available from Mitsubishi Electronics Corp., Hitachi Ltd., Ricoh Corp. and others.

Ink-jet plotters, another major nonimpact technology, output high-quality color or paper and transparency graphics. At the low price end, the Tektronix 4695 has a resolution of 120 dot/in., a copy time of about 2 to 3 minutes, a price of $1,595 and is supported as a demand screen copier of selected Tektronix terminals via vector-to-raster conversion software. Toward the higher resolution end are the Tektronix 4692 and Benson Colorscan 860. The Tektronix Model 4692 makes A-size copies with a resolution of 154 dot/in. at a price of $5,995. The high-resolution winner, with 203 dot/in., is the Benson Colorscan 860, which makes A-size copies in 3½ minutes, can also produce B-size plots and costs approximately $17,500.

Desktop direct-drive film recorders, or

slide composition systems, are becoming popular and available in the lower price ranges. Most require vector-to-raster conversion, usually via a separate hardware module or option. Matrix supplies the QCR D4/Z (with a resolution of 4,096 by 2,732 pixels) and the PCR, now available with a 4,000-line resolution. The Polaroid Corp. Palette is supported by the Lasergraphics MPS-2000 that produces slides with a resolution of 2,048 by 1,366 pixels. The Calcomp Samurai, at about $10,000, produces antialiased slides with a resolution of about 4,096 by 2,732 lines and is driven by a standard host-resident software interface through an IBM PC containing necessary Samurai interface components. The self-contained Bell & Howell Co. Color Digital Imager IV film recorder, at $7,500, has a resolution of 832 by 630 lines and doesn't require additional rasterization. The most recent announcement is the HP 7510 color film recorder with an addressable resolution of 16,344 by 10,896 points per frame. HP 7510 is vector driven, doesn't require a rasterizer and costs $13,900.

Today's business graphics environment is almost not possible without laser printers. The heart of these systems is found in the new generation of high-volume, hard-copy devices that have introduced applications previously unthinkable to anyone who has fed paper and changed pens at a two-pen plotter. Common device features required by most companies using high-volume production graphics devices include:

• Real graphics throughput in excess of one copy per minute of A-size black-and-white copy.

• A cost per A-size, black-and-white copy of less than 2 cents for obvious consumables and less than 5 cents when all maintenance costs are factored in.

• Resolution of more than 240 dot/in.

• Good image quality from both software and the hard-copy device so charts do not appear generated by a computer.

• Device costs that fit the departmental budget. Moderate speed laser printers with 240-dot/in. resolution range from $5,000 to $30,000. Very high-speed laser printers (from 70 to 300 pages per minute) cost between $200,000 and $400,000.

Throughput, or copy speed, is the factor that most differentiates today's A-size black-and-white printers. Laser printers run the gamut from eight to 300 pages per minute. Printers such as the Imagen Corp. 12/300 ($17,500) and QMS, Inc. Lasergrafix 1200 ($20,000), both rated at 12 pages per minute, will usually produce one to two different complex plots per minute in normal corporate environments due to computer overhead and data transmission times. Devices with more efficient on-board rasterization such as the Mondta Corp. SP 508 printer with NMW VP-50 rasterizer (20 pages per minute, $19,000) can sometimes double this throughput.

While devices and applications continue to become more sophisticated, a basic understanding of terms and capabilities can carry a user a long way in effective purchasing and productive use of graphics peripherals. ■

TECHNOLOGY TRENDS

Getting Around In

Departmental Computing

· B Y · L E E · W · D O Y L E ·

Departmental office systems are playing an increasingly important role in distributing processing power and corporate information to the end user.

The data center environment today has stabilized on the IBM mainframe, while the workstation arena is dominated by IBM Personal Computers and Microsoft Corp. MS-DOS compatibles. However, most organizations have yet to link these two environments through a cohesive processing system. A key planning challenge for large organizations is the development of a cost-competitive departmental system that provides communications among the scattered personal computer population, drives multiuser departmental applications and supplies access to host data base information.

Departmental or mid-range systems are combinations of hardware and software that fill the application and communications needs of departments (typically 30 to 100 employees). The four major hardware configurations are minicomputers, supermicros and multiuser systems based on micro-processor technology, local-area networks and file servers and micro-mainframe links.

Faced with the proliferation of stand-alone PCs — research firm International Data Corp. estimates 80% to 85% of all PCs in large organizations remain stand-alone today — and the increasing demands to access mainframe data, the departmental level of the organization needs three primary services: discrete departmental applications, file server functions to link stand-alone PCs and communications links to the mainframe and outside data bases.

Every large department has the need to computerize specific applications. These may include budgeting, a generalized departmental data base, a correspondence tracking system or an accounting system, just to name a few. These applications may have been started on a PC but have grown too large for a single-user, micro-based system. In this case, a multiuser system or a PC network will provide increased access, increased processing power and increased storage.

Many potential powerful and beneficial applications remain largely unexplored at the departmental level. The absence of available processing power and a user base unwilling to wait months for a MIS-designed mainframe application has created an invisible backlog of departmental applications. The availability of multiuser processing at a local level will unleash the development of many innovative, hidden applications.

File server capabilities increase communication between standalone PCs. Stand-alone PCs are islands of information and processing power that remain relatively untapped by most organizations. Today, information transfer is largely accomplished through "sneakernet" — the swapping of floppy diskettes between PCs. File server capabilities would allow PCs to transfer files and share expensive peripherals like laser printers, 3270 emulation, modems and plotters. The addition of a file server also addresses a major security problem inherent with stand-alone PCs: The file server can be equipped by tape backup and automatically store all departmental files.

Increasing demands by end users have forced the MIS department to allow PC users access to the mainframe. Typically, this has been accomplished through products like the Digital Communications Associates, Inc.'s Irma board, which allows a PC to emulate a 3270 machine and attach to a 3274 cluster controller. In addition to being expensive ($1,000 and up per PC), terminal emulation links to the mainframe have not lived up to user expectations. Most end users are frustrated by the complexity of logging on to the mainframe, not to mention the trauma of trying to select specific fields of data from enormous mainframe data bases.

A potential role for the departmental processor is that of mediation between PC and mainframe. The departmental machine can economize on communications links and allow for the creation of a departmental data base containing downloaded mainframe data. This allows for much tighter MIS control over sensitive data and enables departmental programmers to customize specific applications for the end user.

The departmental level is also the logical place to concentrate protocol conversion and gateway functions. Connections to dissimilar systems and networks and links to public networks like

CCITT X.25 can be effectively handled by the departmental processor without having to provide each workstation with a modem and conversion software.

To become a successful part of the information processing structure, the departmental processor must be accepted by both MIS and end users. Three critical end-user concerns are local application development, PC-like response time and availability of a nontechnical (easy-to-learn and -use) interface to network functions and host data bases.

Through the use of industry-standard workstations (PCs and compatibles), the first two challenges can be met. Powerful workstations based on Intel Corp.'s 80286 (and in the future 80386 processors) can allow for rapid, local response time when combined with high-speed local-area networks. The ability to run

Capability	Departmental Processor Type			
	Minicomputers	Supermicros	File Servers/Local-Area Networks	Micro-Mainframe Links
Multiuser applications	8	5	3	2
File server functions	5	5	7	4
Communications to the mainframe	7	4	3	7
User Interface/Ease of use	4	5	7	2

Ratings are based on scale of 1 to 10 in comparison to other departmental systems.

Figure 1. Rating The Capabilities Of Departmental Systems

standard MS-DOS applications at the workstation level and Unix (or another multiuser operating system) at the departmental level enables the end user to choose from a wide variety of single-user software or take advantage of powerful

multiuser applications at the departmental level.

The most difficult challenge is the development of software to give the user transparent access to network resources and departmental or host data. Today most users are confused as to how they can access data not local to their workstation. An ideal solution would be a PC-based front end that would interpret the user request for data, access the network and retrieve the data requested — without the user needing to know the structure of the data and where the data resides. Unfortunately, systems with these capabilities are still years away.

The competition to provide departmental computing has been heating up in 1985 and 1986. The four leading options to provide departmental processing are minis, local-area networks, micro-mainframe links and supermicros. Traditional mini vendors (Digital Equipment Corp., Data General Corp. and Hewlett-Packard Co.) are extending from their strength in technical/scientific computing toward providing integrated office software, file serving for PCs and links to IBM mainframes.

Local-area vendors (Novell, Inc., 3Com Corp. and Nestar Systems, Inc.) have standardized on IBM protocols and are beginning to offer multiuser net applications for sites with stand-alone PCs. Supermicro vendors (Altos Computer Systems, Inc.; Sun Microsystems, Inc.; Apollo Computer, Inc.; and Intel) are positioned to provide lower-cost, Unix-based computers for the department.

Although not traditionally thought of as a departmental option, micro-mainframe links can offer many departmental functions including data distribution from the mainframe to the workstation, file serving and electronic mail. Micro-mainframe links are the leading option for organizations wishing to implement a two-tiered information processing structure (mainframe and workstation).

Organizations shopping for departmental systems are faced with numerous trade-offs when deciding which type of system to acquire. For example, file server/local-area network systems offer the advantage of good local communications functions and an IBM PC-DOS user interface but offer limited communications to the mainframe (terminal emulation only) and only a few multiuser applications. On the other hand, micro-mainframe links offer customized access to information on the mainframe but fall short in offering multiuser departmental applications and have complex user interfaces. Figure 1 evaluates the strengths and weaknesses of departmental systems.

Designing and implementing departmental computing will continue to be a challenge for large organizations for at least the next three to five years. Organizations must pay attention to user needs while also designing an organizationwide architecture for distributed processing and information transfer. Existing departmental system options have unique strengths and weaknesses. It is likely that ad hoc solutions will fail. Organizations that plan for departmental processing and offer customized systems will have the best success.

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MIS STRATEGIES

Who's In The Driver's Seat?

· B Y · S T A N · K O L O D Z I E J ·

MIS responsibilities and clout appear to be increasing with top management, end users and even vendors in their product planning and market strategies, according to a recent *Computerworld Focus* survey of MIS managers from a sampling of large corporations.

We caught up with these managers at a time when MIS is assuming more responsibility in shaping the future direction of office systems in corporate America. Our survey indicated MIS has been putting pressure on IBM to shore up its mid-range departmental computing offerings, while some MIS managers are expressing more interest in new departmental machines being introduced by vendors such as Digital Equipment Corp., Maynard, Mass., and Data General Corp., Westboro, Mass.

Another finding has MIS clamoring for peer-to-peer communications within IBM's Systems Network Architecture (SNA) communications environment. MIS is also looking critically at IBM's new line of 3090 series mainframes and concluding that it doesn't always have to dance to IBM's tune.

MIS has been flexing its muscles in other areas. A new survey of MIS managers from the Cambridge, Mass.-based market research firm Arthur D. Little, Inc. concluded that MIS is playing a leading role in two concurrent computing trends at U.S. corporations. The research firm sees MIS behind the continued push to decentralize corporate computing resources, distributing equipment and applications within various departments. The flip side of the report also has MIS assuming added administrative power, with more telecommunications and office systems managers reporting directly to MIS. A related development has a greater number of corporate information officers being hired from the ranks of MIS, lowering the percentage of information officers taken from corporate business ranks.

With this consolidation of administrative power has followed a tighter MIS hold on corporate data processing purse strings. MIS is using this power to pull in the reins of users groups that are being perceived as having gained too much autonomy regarding equipment selection and purchases. As a result, MIS has found itself in the uncharacteristic role of trying to walk the fine line between imposing purchasing and other standards on users while also providing them with broader scope in the types of applications, training and support they want.

Why the change toward greater MIS control? Surveyed MIS managers listed various causes.

One major cause can be traced to some of the negative reactions to the great influx two years ago of PCs in offices. As more PCs spread throughout organizations, MIS began to lose some control, having to rely on users groups and departmental managers to handle much of the purchasing coordination and placement of the micros throughout offices. At first MIS welcomed the trend, believing it would off-load some of the terminal/mainframe application demands users were exerting on heavily burdened, centralized DP centers. Few corporations, however, had the kind of infrastructure in place outside the MIS department to coordinate wholesale purchasing and placement beyond the immediate needs of individual users. The result was confusion.

"Once the micros were in place at our company," explained Gary Banks, director of information services at Clairol, Inc. of Stamford, Conn., "we had users coming to us [MIS] for help. Many didn't know what to do with the computers. It was different than having terminals tied into mainframes. Many of these people were suddenly working on their own."

Banks explained that Clairol, like many organizations, began to pull back on more PC purchases, while at the same time trying to come up with a clear picture of how these micros could fit into the corporate computing scheme of things. Clairol has since established what Banks termed an "evolutionary" program, introducing PCs gradually in line with true departmental needs, at the same time building an adequate training and support structure and standardizing on a few established vendors and applications.

The change has been beneficial. "The level of user expertise is starting to merge with the new level of micros available," Banks explained. "We're seeing a new generation of PCs coming out that have the power to become hard-disk file servers in true multiuser applications. Users who have graduated from word processing and spreadsheets can now handle harder decision support applications through these multiuser systems. The learning curve is where we want it."

The industry is also experiencing a push to integrate computing through local-area networks and micro-to-mainframe links. Users with PC experience, for example, are now demanding on-line access to other departmental and corporate data bases. Thriving hardware and software industries are springing up, providing the links to do it. At the higher end, vendors such as DEC, DG and IBM have heeded the call and are making sure their new computer products not only tout

MIS STRATEGIES

increased millions of instructions per second and better price/performance ratios but also the capability to communicate with other systems, most notably those within IBM's SNA architecture. This has put a greater emphasis on centralized coordination that, more often than not, has been placed under the aegis of MIS.

Vendors are now offering such intervendor equipment compatibility as a matter of fact, simply because it carries greater weight in final MIS purchasing decisions than it did even a year ago. As a result, vendors of local-area networks and PC communications links are changing their marketing strategies. These vendors are heading straight for MIS managers instead of users, aware of the increased sway in purchasing power and decision making that MIS has. Vendors know where the purchasing power lies.

"Anything in this company related to computers and that costs more than $250 now has to go through our [MIS-controlled] centralized purchasing center," explained Ted Smith, manager of systems development at Union Carbide Corp. of Danbury, Conn. "This also includes anything to do with networking."

Smith said that although Union Carbide is a successful decentralized computing company, with each division handling its own computer processing and applications, the decision to centralize purchasing stemmed from what he described as a corporate ultimatum to keep DP costs under control. "PC purchases have stabilized for the time being at our company," Smith explained. "We're evaluating what we already have."

Clair Noll, vice-president of procurement and computer services at Pennsylvania Power & Light in Allentown, Pa., explained that all end-user computer purchase requests at the company now go through a Corporate Computer Steering Committee. "We only have about 100 desktop micros right now," Noll said. "Being a company that deals a lot with transaction processing, such as customer credit accounts, we've relied more on terminals than PCs. [The company now has 2,200 terminals connected to IBM mainframes.] We need big data bases. Though top management has decided to control the growth of all keyboards out there, including terminals, we especially keep an eye on micros and how they are tied into these data bases. Centralized purchasing is a good way to maintain control."

I n a war, the attempt to increase decentralization under the more centralized guiding light of MIS is leading MIS into a dilemma. Already groaning under the weight of mainframe application backlogs and some budgeting cutbacks, MIS often has neither the time nor the means to bring computing power to users as quickly as corporations want it. Ironically, MIS' strong reaction to indiscriminate micro purchasing might have resulted in the swinging of the pendulum to the other extreme: a slowdown in bringing microcomputing to those users in corporations that are ready for them.

To help open the bottleneck, we found many MIS departments have established entities such as information centers or their equivalents. Information centers can play a vital role in developing low-level user applications as well as training and support programs that many MIS departments simply cannot provide. Though the concept of information centers is not new, the number of info centers has escalated dramatically in the past year or so (with or without MIS blessings) due to the pragmatic realization of their

> *Groaning under the weight of mainframe application backlogs and budgeting cutbacks, MIS has no time nor means to bring computing power to users.*

necessity in companies.

"We've had an information center in place for a year," explained Bob Sanders, director of management information systems at Kenner Products Co. in Cincinnati. "It was created because there were problems with data integrity and a lot of reentering of data, which was wasteful. That's been solved."

Software developers have not been slow in realizing the market potential of end-user computing channeled through information centers. A number of software vendors are introducing user-friendly, fourth-generation language development tools with which users can quickly sketch and prototype their own custom applications on micros, usually with the help of junior programmers.

These prototypes are then taken by programmers to be quickly coded [many of these tools enable users to do their own coding] into third-generation languages such as Cobol, allowing them to be uploaded to run on mainframes or departmental minicomputers. The end result has been a servicing of user needs without tying up mainframe power and time. More importantly, this process has taken away few precious man-hours from the DP center.

Such localized fourth-generation application development tools employ artificial intelligence techniques that bypass much of the arcana of traditional DP center programming at the wave of the future. While MIS has resisted introducing fourth-generation languages into the mainframe environment because of their perceived weakness in handling large applications, MIS is realizing its benefits in the user environment.

"We encourage users to develop their own applications through a time-sharing environment or with micros and fourth-generation tools," explained Kevin Moody, corporate director of MIS at Gillette Co., Boston. "Systems development is done in MIS, but users can produce their own decision support programs. If they think they can do it, we'll provide

the tools. Above this, we've narrowed the field to a certain number of vendors to provide fourth-generation language data bases for our [DEC] VAX minis."

The current trend toward corporate budget cuts, which also affects MIS, could have some unexpected repercussions beyond the DP center. As more companies promote corporate information officers from the ranks of MIS, the MIS-based mind-set of centralizing corporate computing will no doubt gain more currency, especially in the larger Fortune 500 companies, where this trend is more prevalent. The tendency to reprioritize computer purchases through MIS, under current budget cuts, could place a greater emphasis on larger systems at the expense of smaller, distributed processing systems.

"Several years ago, we were a centralized processing operation," explained a general manager of information systems at a large Eastern manufacturing concern who did not wish to be identified. "We decentralized a few years ago to the departmental level, but now we're recentralizing again under MIS. The data processing budget has been flat since late 1985."

The general manager went on to explain that the company's decision to centralize was due in part to what MIS felt was a lack of control over data integration and security at the various operating divisions, but it was also related in large part to the growing influence of MIS "at the higher corporate levels." He added that end-user computing was put on hold to make way for hot computing applications such as computer-integrated manufacturing and computer-aided design and computer-aided manufacturing. "MIS can relate more to the engineering types," he concluded.

At the high end, our survey indicated bigger is no longer thought to be automatically better with many MIS managers. Most surveyed companies were IBM shops that had mixed feelings about the recently introduced top-of-the-line IBM 3090 series of mainframes.

Noll of Pennsylvania Power & Light declared the 3090 "a good technology move for us," fitting in nicely with the company's DP growth curve. Others, such as Smith at Union Carbide, are planning on migrating some of the mainframe applications and development to the more powerful series of mid-range computers now being introduced by DEC, DG and Hewlett-Packard Co. Or at least they plan to hold back on new mainframe purchases, content with the raw processing power they already have and concentrating instead on revitalizing old Cobol programs and new applications.

Though IBM is still considered untouchable at the mainframe level, it seems to be losing ground with MIS managers at the departmental level. In traditional Achilles heel. Companies such as DEC sense the kill and are stepping up their mid-range product introductions, scurrying to solidify their position between the end user and MIS departments before IBM gets its act together. A new breed of SNA gateways helps to join these systems seamlessly with IBM mainframes and minis. MIS is taking notice.

"Most corporations are more cost-conscious now," Sanders at Kenner Products said. "They're consolidating and looking hard and long at new systems before they purchase. I don't think we're alone in that." ∎

Kolodziej is a senior writer at Computerworld Focus.

CORPORATE ACCOMPLISHMENTS

OA Power At PG&E

· B Y · L E E · W H I T E ·

> *Under the wing of the vice-president of Computer Systems & Services, the manager of the Office Technology Project, with just a few staff members, fostered and nurtured the growth of office automation at PG&E, using the personal computer as a cornerstone.*

Automating operations to spark productivity is no small feat for any organization. But when you are a major utility company with a widespread user base, it could take a lot of energy.

With 6.8 million customers spread over 94,000 square miles of northern and central California and total assets of more than $19 billion, Pacific Gas and Electric Co. (PG&E) is the nation's largest investor-owned electric and gas utility. Its 30,000 employees operate at company headquarters in downtown San Francisco and out of six outlying regions.

The statistics for PG&E's data processing department, called Computer Systems and Services (CS&S), are equally mind-boggling. CS&S has 814 staff members, nine mainframe computers and 5,000 microcomputers. Management at CS&S estimates there are 15,000 employees, 50% of the total population, who use computers with some degree of frequency.

Office automation at PG&E began in 1979 when President-Elect

George A. Maneatis, then vice-president of CS&S, became concerned about the proliferation of memory typewriters. As was the case in most companies, there were many factions that had preferences for one brand over another. "[Maneatis] said, 'Wait a minute. A typewriter is a typewriter. We're going to buy a good memory typewriter, one kind, and we're going to get volume discounts on it, simple as that.' " explained William H. Wallace, vice-president of CS&S, who was Maneatis' assistant in 1979. In this way, Wallace said, Maneatis staked a claim to any typewriter with more than 2K bytes of memory, claiming that any such machine was a computer.

It was not long before dedicated word processors began to appear on the scene, but CS&S took a rather hard line on justifications for such machines, because a fully configured IBM Displaywriter, for instance, cost more than $12,000. Eventually, the company wound up buying "more than 50 and less than 200," Wallace said.

But the real revolution occurred in 1981 with IBM's announcement of its Personal Computer. "We were all sitting here watching [Apple Computer, Inc.], and you'd get out your joystick and play games with Apple computers. Apple was saying, 'We sure would like to get into the business world,' and everybody laughed. Along comes the announcement of the PC and all of a sudden it was just dead obvious to me, the afternoon we heard about it, that personal computers had gone from cutesy things into something called a personal computer. That was a major change in semantics, in whole attitudes," Wallace said.

Like many other data processing departments, there was a certain amount of disdain on the part of management. But Wallace prevailed, stating that "to sit in the middle of a railroad track with that freight train running straight at you at 80 miles per hour, waving your little red flag to try to slow it down is not going to do any good."

At about this time, Wallace hired Thomas J. Buckholtz to head up the Office Technology Project. Buckholtz, a University of California, Berkeley, Ph.D., had played with computers in high

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school and at the California Institute of Technology in the '60s where he earned an undergraduate degree in physics.

Under Wallace's wing, Buckholtz, with just a few staff members, fostered and nurtured the growth of office automation at PG&E. Because management said it believed the microcomputer was going to have phenomenal impact on the way people did their jobs, they made justification easy and the rules simple to follow: The computer had to be IBM or IBM compatible; and the software, most of which was for word processing, was predetermined for two reasons — it had been evaluated and found adequate and PG&E was able to negotiate economically advantageous site licenses.

People who had never used a computer welcomed the micro with open arms. Those who had been using dedicated word processors were at first wary, primarily because the word processing software for the micro was not as good as that for the dedicated machines. However, as time went on, even that changed. "There was so much diskette frisbee going on, and the [dedicated word processor] couldn't play. Soon, [the dedicated word processor users] were turning them in as fast as they could find a place to sell them for junk," Wallace said.

But word processing and simple spreadsheets are just the tip of the iceberg for microcomputer use at PG&E. Users have stretched the envelope and busted it wide open, with the help of Buckholtz's group and other specialized departments created within CS&S.

At the core of microcomputer use is the formalized training procedures that have been in place since the beginning. Once microcomputers became a force at PG&E, management in CS&S realized that training thousands of people scattered over more than half of the most populous state in the country could not be done by trainers based in the department. In addition, one of the principles of the Office Technology Project is user self-sufficiency. As a result, the department offers intensive, four-week, train-the-trainer programs for selected members of the user community. These people are taught how to teach others to use computers, are armed with all the manuals, software and training materials necessary and sent off to spread the microcomputer gospel.

A ccording to Buckholtz, in addition to user self-sufficiency, the Office Technology Project also follows the principles of awareness of common and diverse needs, user-friendliness of hardware and software, ease of integration, flexibility, common placement of information resources at the mainframe and sequencing and timing. Ease of integration and flexibility go hand in hand, Buckholtz explained: By integrating common technologies, practices and procedures, the flexibility to phase out obsolescent hardware and software is relatively painless.

Buckholtz placed particular emphasis on sequencing and timing, explaining that new bells and whistles on the technology scene are of no interest unless the technology is ready for PG&E and PG&E is ready for the technology.

Wayne Hong, senior systems engineer in Management Sciences, found that the supermicrocomputer was a technology for which PG&E was ready. "The applications that we needed involved planning

"Along comes the announcement of the [IBM] PC. ... That was a major change in semantics, in whole attitudes."
— William H. Wallace
Computer Systems and Services

studies, system protection studies, heavy numbers types of applications. Some of these studies took an hour of CPU time on the mainframe. And these kinds of applications constitute 70% of our mainframe activity," Hong explained.

By creating four separate networks of supermicrocomputers, users can act independently of the mainframe and still share data with users on their own and other networks. Another benefit is the speed with which the engineers are able to perform critical computations. The third benefit — and perhaps the most important to the traditional mainframe managers and, as a by-product, other users of the mainframe — is the removal of intensive degradational applications from the mainframe environment.

Hong also pointed out some hard dollars saved with the installation of the

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supermicro networks. "If something happened to a piece of the protection relay equipment, the relay should try to isolate the fault so the rest of the system would not be affected. We have about 4,000 transmission lines and lots of loops. Every time [the engineers] want to do a study, they have to conceive of all the scenarios and lots of calculations. A thorough job would probably cost $300,000 a year. With the supermicros, the cost would be about $50,000 a year — the cost of one full-time engineer," Hong explained.

New areas of technology usually do the trick at PG&E, and the firm is for the most part far in advance of the technology.

Take as an example its outlying regions: Two years ago the six regions, with their 15,000 employees, had no mi-

> " Bell-and-whistle technology is of no interest unless the technology is ready for PG&E and PG&E is ready for it. — Thomas J. Bonkalski, Office Technology Project

crocomputers. Jerry L. Hunter, manager of the Oakland, Calif. region, and others perceived and demonstrated a need for computing power, and the regions were given 20 micros. Today, there are 1,200 microcomputers in the regions, and those computers are being used for applications that must have surprised even the techies back at headquarters in San Francisco.

Hunter himself was responsible for the formation of a users' council, made up of representatives from all the regions, and he represents the regions at the headquarters-based Microcomputer Review Committee. One of the greatest successes, according to Hunter, is the excitement of the users. "We found so many people with untapped talent. There was some resistance from the old-timers, but the interest was there," Hunter said.

Shirley Fickett, computer systems analyst in the Engineering Computer Sciences Department, is helping people in the various regions maximize their use of computers primarily because the regions have limited access to the mainframes in San Francisco but also to "limit paper passing and increase the turnaround."

Fickett was called in to solve a particular problem for the estimators and mappers in the Bay Area who were overloaded with new service requests from condominium and mall developers. Once the developers submitted plans to the utility, PG&E mappers and estimators were required to go to the site, determine what new facilities were needed, put up a map, determine what rights-of-way and property lines were necessary, then send the completed map to the PG&E construction crews so that facilities could be constructed.

Because of the construction boom in the Bay Area, mappers and estimators were working more than eight hours a day at least six days a week. Fickett installed personal computers with computer-aided design (CAD) software and, although the project is still technically in the pilot phase because users are still learning the system, they are at a breakeven point on the automated vs. manual system. According to Fickett, "Guesstimates are a minimum 20% increase in productivity." The estimators and mappers will be ecstatic to go back to regular time."

A nother specialist for the regions is Trista Berkovits, who joined PG&E seven years ago as a gas engineer and migrated over to the CS&ES department as a senior computer applications engineer in the Engineering Computer Applications Department. Berkovits is heavily involved in a project dealing with moving mainframe data down to desktop computers, partially because mainframe communications access is expensive but primarily because PG&E is trying to decrease the number of applications running on the mainframe.

Before the programs were rewritten to run on microcomputers, engineers in the field had to rely totally on CS&ES staff at headquarters. It often took a couple of weeks by the time people at headquarters processed the engineers' requests and, if the output was inaccurate, the whole process had to be repeated. "One of the things PG&E is trying to do is to put the decision making closest to the user. The people in the regions who are modeling their distribution systems really are the best able to tell what they should model, how they should revise and so forth,"

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according to Beckum's.

Rose Bonacum, a computer analyst in the Customer Operations area, provides support to departments at headquarters, including customer services, energy management and residential conservation services, and promotes the same to those departments in the regions. She functions as a liaison, meets regularly with the regional computer users' council and sits on the Microcomputer Review Committee. Internally, her area includes about 250 people, and in the regions there are about 1,000 people who depend on her for support.

Because the regions have become so dependent on computers — and with that dependence comes a literacy that may turn to frightening sophistication — a new group was set up just more than a year ago. The group, Computer Client

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> *Perhaps the real success story at PG&E is one that many companies could learn from: 814 staff members in the DP department, nine mainframes, 5,000 microcomputers and a computer literacy rate approaching 50%.*

Services, is made up of 13 people with heavy computer science background who actually live in the regions. What this provided to the regions, said Arthur M. Beckman, who started the department, was a computer back on the premises: "somebody [regional users] could come

to with concerns."

Beckman, who became involved in the desktop computing movement about four years ago, originally thought that training users in the region could be accomplished by sending trainers out to travel the state. It took little time for Beckman

to realize that a couple of trainers traversing the service area of PG&E might get back home sometime in the mid-90s. "So we regrouped and formed this train-the-trainer concept. We have people throughout the state helping us train others. For some it's maybe 10% of their job; for others it's closer to 100%. Seeing how the training was going and seeing the need for more direct support was one of the reasons Computer Client Services came into being," Beckman said.

Brian S. Lunde, who is taking over supervision of Computer Client Services so that Beckman can go back to the big-iron environment of Information Systems at headquarters, said he sees a continued importance placed on the role of the regional computer coordinator. "As part of the region, we can coordinate and establish a common basis of planning," Lunde said. Beckman says 1986 as a year of continued support and marketing of services with level staffing but predicts 1987 will be the growth year requiring increased staff support for an expected increase in the number of users.

The future certainly looks bright for those involved with computers and office technology at PG&E. Among the evolving technologies, Office Technology Project's Buckholtz noted that desktop publishing, file transfer between mainframe and micros with proprietary software and departmental computing using micros on local-area networks are high-priority items.

Wallace is particularly excited about an electronic postal service, which came out of an idea he had for a shared information system. With the postal service, documents are created on microcomputers and queued out to the micros hard disks. When traffic on the mainframe is light, out goes the electronic mail corner: "snatches all the mail and brings it in sorts it and puts it in various out baskets." Wallace explained. When the traffic is again appropriately light, mail will be delivered to the designated recipients.

At the heart of the electronic postal service is the mainframe working in tandem with the microcomputer, two-thirds of what Wallace calls the three-tier computing philosophy. The missing link at this time is the middle-tier computer. While Wallace is not sure when that computer will be available, he knows its specifications. "We're going to make absolutely certain that the middle-tier computer, the work group computer, is a great communications controller and a great file server and a lousy computer. Otherwise, all we'll do is migrate the mainframe slowly out to the departmental computers," Wallace said.

Perhaps the real success story at PG&E is one that many companies could learn from: 814 staff members in the data processing department, nine mainframes, 5,000 microcomputers and a computer literacy rate approaching 50%. Isn't all this mighty expensive? Hard to justify? Will they ever see a payback? Will they have to pass on the cost of such expensive programs to the consumer?

Judging by recent news about the utility, the answer is no. PG&E recently filed rate requests with California's Public Utilities Commission that include cuts of 5% for residential users, 12% for commercial and agricultural customers and 19% for industrial users. ◻

White is a senior writer of Computerworld Focus.

BOTTOM-LINE PLANNING

Cost Justifying Investments In Office Systems

· B Y · J O H N · J · C O N N E L L ·

What's the bottom line? How many people will it save? What is the rate of return on the investment? The inability to provide senior management with answers to these questions is the primary reason for the slowdown in the introduction of advanced office systems into U.S. industry and the traumas that have befallen the computer industry in the past year and a half.

Organizations went on a buying binge in 1983 and 1984, bringing in personal computers and other devices without justification. Everyone was supposed to become computer literate, the initial cost of individual machines was relatively low and the threat was that those who did not get on the bandwagon would be left behind. Good management sense was thrown to the winds in the rush to put a terminal on everyone's desk.

Beginning in late 1984, senior management became suspicious. What had been touted as a relatively small investment (if you looked only at the purchase price of personal computers) soon became a large investment as the total machine population grew by leaps and bounds. Software became a major additional cost factor, and the price of training and continuing technological support was grossly underestimated.

Management also discovered another disconcerting fact — the machines were being used infrequently or not at all. Because no prior justification for acquisition was required and no system was in place to track the benefits of machine use, users did not feel obligated to maximize the return on machine investment. Furthermore, the much-heralded ease of use of personal computers turned out to be a pipe dream. The single-application syndrome that is found among personal computer users today is a direct result: Having put forth the extraordinary effort required to master one application, users are loath to take on a second.

The size of the investment in these machines and their lack of use caused senior management to ask about the rate of return on PC investments. For most companies, the question could not be answered.

Senior management's response was short and to the point: No more investments in information technology until the return on the investment could be measured in a rational way.

That response, thundering across corporate America, signaled the end of 30% to 40% per year growth rates in equipment sales and raised havoc throughout the vendor community.

There are still those who challenge the need for cost-justification. They reason that personal computers should be as ubiquitous as telephones. There may well be some merit in that view, but the argument falls apart when machines are tied through telecommunications networks in advanced office systems. Such network-based systems represent a major financial commitment and an even heavier operating commitment. They not only cost a lot, but they change the way people do their jobs. Prudent management demands that they be properly justified before installation and that their impact be properly tracked and measured thereafter. The question is how.

In the late 1970s, Booz, Allen & Hamilton, Inc., a management consulting firm, conducted a landmark study under the sponsorship of a number of major vendors to determine how office automation would affect managers and professionals. Special data gathering techniques were used to identify and quantify the various activities carried on by personnel in that category, leading to the detailing of time spent in meetings, on the telephone, handling correspondence and so on. Booz Allen reasoned that if OA tools were applied to those various activities, firms would realize substantial time savings that would translate into hard dollar savings. Statistics published at the time estimated a potential savings of $300 million in U.S. corporations due to office automation.

Many companies used the Booz Allen rationale as the basis for

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investing in advanced office systems. They did their own data gathering and analysis. Understanding that four percentage breakdowns matched Booz Allen's and therefore accepted the balance of the rationale. The problem these firms came across and still deal with is that there is no way of determining whether they have achieved time savings and, more importantly, whether the time saved actually translates into dollar savings.

Many others have pursued variations on the Booz Allen theme in an attempt to categorize and measure office-based work in a way that would permit discrete analysis of the impact of office automation tools. Different data gathering techniques have been employed, new categories of work have been identified and a host of measurement methodologies have emerged.

The Sassone-Schwartz approach — the latest of these methodologies — uses data gathering techniques to identify work categories and identify categories as being of high, low or no value depending on the type of worker and then assigns a dollar value to each category. Thus, a professional who spends 50% of the week year doing professional work, 35% doing clerical work and the balance on unproductive activities would be assigned a total dollar value. Professional work would be credited at the professional's real cost — salaries, benefits and overhead. Clerical work would be credited at the real cost of clericals doing similar work, and unproductive work would be credited at zero. The objective of any investment in OA would be to trigger a shift to the higher value work categories, thereby increasing the total value of the individual employee.

The problem with all of these techniques for justifying investments in advanced office systems is that they use the saving of time, or more effective use of time, as the key objective of the system. Such objectives are valid when dealing with clerical activities involving standardized, repetitive tasks. They are not valid when dealing with managers and professionals whose activities are neither discrete nor standardized nor repetitive. In regard to personnel in these categories, the objective of advanced office systems is to help improve performance. Measurement systems must be structured accordingly.

Paul Strassmann, retired vice-president of Xerox Corp., espouses this philosophy in his book *Information Payoff*. He said he believes that investments in information technology should be evaluated in terms of their impact on managerial productivity — which he defines as the value added by management to an enterprise. In the book, he presents a relatively straightforward formula for calculating managerial productivity using a typical profit-and-loss statement. The formula involves removing from gross revenue all those expenses over which management does not exert primary control (such as the cost of goods purchased and the cost of capital), treating the combination of capital as break even and reducing revenue further by the cost of operating labor. The ratio of the remainder, adjusted gross revenue vs. the cost of management labor, is the value added by management; the measure of managerial productivity. According to Strassmann, that ratio tracked over time is the ultimate test of managerial performance. Investments in information technology should be jus-

tified based on how much that ratio is improved.

Putting aside some arguments about the methodology, which has been challenged in many quarters, the shortcoming of this approach is that it can only be applied to business units or profit centers, that is, organizations that have an actual profit-and-loss statement. Unfortunately, most corporate organizations are not true profit centers, and for them an entirely different approach must be developed for justifying investments in information technology.

The Office Technology Research Group has been pursuing the question of cost-justifying investments in advanced office systems since its formation in 1977. From these studies, the following four principles have emerged:

• Advanced office systems change the way people do their jobs. Traditional before-and-after analyses of the impact of these systems do not work. The evidence is overwhelming that as people use the

> *The purpose of advanced office systems is to help improve the performance of individuals and, collectively, the unit. You may take pleasure in citing examples of individual improvement, but the bottom-line impact of such systems can only be determined through measurement of improvements in unit performance.*

machines, they change procedures, processes, communications patterns and operating relationships in ways that cannot be predicted beforehand.

• The impact of a system can only be determined over an extended period of time. When DP systems are installed, their impact can be determined shortly after the cutover date. With advanced office systems, sufficient time must be allowed for the system to be integrated into the work patterns of an organization. Only when systems usage becomes a normal work activity can improvements be identified and measured. Furthermore, in such identification and measurement, special attention must be paid to changes in the internal and external operating environments.

• Machine performance cannot be measured separately from human performance. Here again, the experience with DP systems is entirely different from that with advanced office systems. The former substitute machine labor for human labor, often in a direct trade-off. The latter augment the talents and capabilities of the users. Thus, any measurement system must look at the users and the machine as a combined entity.

• Advanced office systems can only be measured in terms of their impact on organizational performance. The purpose of such systems is to help improve the performance of individuals and, collectively, the performance of the units to which the individuals are organizationally assigned. You may take pleasure in citing examples of individual improvement, but the bottom-line impact of such systems can only be determined through measurement of improvements in unit

performance, as attested to by the existing performance measurement system.

A recent example of these four principles in action involved the Western Division of GTE Corp. The case is a good example of an approach to performance measurement in both time and staff departments and also an illustration of the extent to which machines can change the way people do their jobs.

The Western Division of GTE builds and sells sophisticated telecommunications systems to the military. One department, made up of engineers, administrators and support personnel, is responsible for developing project proposals. To control costs, the firm makes maximum use of support personnel to assemble information and prepare drawings because such personnel cost approximately one-third what engineers cost. The engineer's role is to conceptualize the proposal, monitor its development

and track its progress in frequent project meetings.

The department installed a system consisting of 150 terminals with good graphics capabilities tied to a telecommunications network that interconnected many of the terminals to a large mainframe. No attempt was made to change the way proposals were prepared before installing the machines. The system was put in to support the existing process, but after departmental personnel became familiar with the machines, they were allowed to introduce whatever changes they thought would be beneficial. After two years of operation the following occurred:

• The proposal development process has completely changed. Rather than conceptualizers and monitors, the engineers have become direct participants. They use the graphics capabilities of the machines to prepare drawings rather than relying on draftsmen, they enter text themselves rather than through typists, they use the network to track project progress rather than conduct meetings and they draw directly on data stored in the mainframe.

• Although the use of expensive engineers for these various activities would appear not to be cost-effective, the reverse is true. Because of the lessened requirement for support personnel, the reduction in meetings and the virtual elimination of rework, that is, the need to redo unsatisfactory work, the department has estimated it is saving $8.5 million annually on a one-time investment of $10 million.

• The need to attend fewer project meetings has freed up sales personnel so

that they can spend 50% more time in customers' offices (perhaps of greatest importance in the long run).

• Demonstrable improvements have been made in proposal quality and timeliness.

How were these benefits measured and, perhaps more fundamentally, why was the system brought in in the first place? More than two years ago, the manager of the Western Division of GTE, concerned about the productivity of his operation and the quality of its output, called upon Jonathon Brown, manager of quality from GTE's corporate headquarters in Connecticut, and David Shay, manager of productivity for Peat, Marwick, Mitchell & Co. in New York, to critique his operation. Shay and Brown conducted a number of interviews of senior and middle management to obtain answers to the following questions:

• What are the objectives of the various components of the department?

• How do you define and measure success?

• What are the critical functions and activities that contribute to success?

• What are the current shortfalls in performance?

From their interviews and subsequent deliberations with technological personnel, a system was configured to provide various operating capabilities and gross estimates were made of the possible benefits of such a system. Concurrently, a methodology was developed by Shay and Brown to track those elements of departmental operations that would have a critical impact on success, as success was defined by division and department management. A proposal describing the system, the potential benefits and the tracking methodology was accepted by senior management and the project moved forward to achieve the results cited.

Lessons to be learned from the GTE case parallel those experienced by many others. Personnel using advanced office systems change the way they carry out their assignments. In so doing, users become inextricably intertwined with machines making it impossible to measure the performance of one separately from the performance of the other. Changes brought on by the use of such systems take place over and are occurring continuously. Any measurement of the impact of advanced office systems must be in terms of improvement in unit performance, as such improvements are defined by operating management.

For those accustomed to justifying investments in office technology through head count reductions and other hard dollar savings, such measurement approaches may seem imprecise and fuzzy. In fact, they are not. They recognize that advanced office systems are rapidly becoming an integral part of ongoing operations rather than a separate, ad hoc activity.

Advanced office systems are a key element in improving the performance of knowledge workers and the contribution such personnel make to the success of an enterprise. How you measure that contribution is the key determinant in how you measure the impact of advanced office systems.

Connell is executive director of Office Technology Research Group located in Pasadena, Calif. He founded the company in 1977.

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6	26	46	66	86	106	126	146	166	186	206	226	246	266	286	306	326	346	366	386
7	27	47	67	87	107	127	147	167	187	207	227	247	267	287	307	327	347	367	387
8	28	48	68	88	108	128	148	168	188	208	228	248	268	288	308	328	348	368	388
9	29	49	69	89	109	129	149	169	189	209	229	249	269	289	309	329	349	369	389
10	30	50	70	90	110	130	150	170	190	210	230	250	270	290	310	330	350	370	390
11	31	51	71	91	111	131	151	171	191	211	231	251	271	291	311	331	351	371	391
12	32	52	72	92	112	132	152	172	192	212	232	252	272	292	312	332	352	372	392
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14	34	54	74	94	114	134	154	174	194	214	234	254	274	294	314	334	354	374	394
15	35	55	75	95	115	135	155	175	195	215	235	255	275	295	315	335	355	375	395
16	36	56	76	96	116	136	156	176	196	216	236	256	276	296	316	336	356	376	396
17	37	57	77	97	117	137	157	177	197	217	237	257	277	297	317	337	357	377	397
18	38	58	78	98	118	138	158	178	198	218	238	258	278	298	318	338	358	378	398
19	39	59	79	99	119	139	159	179	199	219	239	259	279	299	319	339	359	379	399
20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400

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PRODUCTS

DEC Expands Network Line With Three New Products

MAYNARD, Mass. — Included in recent announcements made by Digital Equipment Corp. were three products targeting local-area networks.

According to the vendor, Decnet-DOS V1.1 will allow IBM Personal Computers to participate in and nodes in Decnet Phase IV computer networks. Features available with Decnet-DOS include the ability for IBM PCs with currently installed 3Com Corp. or Micom Systems, Inc. Interlan Ethernet boards to communicate and share information with other computers, workstations and terminals in a Decnet network; facilities for sharing files and data across a network; and the ability for users to expand the resources of desktop workstations by giving the Microsoft Corp. MS-DOS system access to the disk storage and high-speed, letter-quality printers on other systems in the network. Decnet-DOS V1.1 will be available in June for $500.

The Decconnect System specifies a method of installing cabling and networking components in a facility. The system uses a radial cabling topology and consists of four parts. The Thinwire Ethernet Multiport Repeater, priced at $2,900, is a radial hub that connects eight thin RG58 coaxial cable segments. The Thinwire Ethernet Station Adapter, with a price tag of $275, is an IEEE 802.3/Ethernet transceiver that allows

standard Ethernet products to connect to Thinwire Ethernet cable. The H4005 Ethernet Transceiver ($300) is a nonobtrusive tapping transceiver unit that physically attaches to an Ethernet coaxial cable. The Delua-M Ethernet Controller ($3,275) is used to interface an Ethernet local-area network to most Unibus-based systems. All of the products that make up the Decconnect System will be available in June.

DEC also announced seven Standard Network packages, made up of hardware, software and services, based on the Decconnect System. Two of the packages provide networking capabilities for connecting terminals, personal computers and workstations to Ethernet networks; three packages provide capabilities for networking contiguous work groups on one floor, for connecting floors together and for connecting the traditional computer room to the network; and two packages provide for connecting multiple, geographically dispersed locations and for communicating with an IBM Systems Network Architecture-based environment. The packages range in price from $5,800 to $59,200 and will be available in June.

For more information about any of the products, contact Digital Equipment Corp. Maynard, Mass. 01754.
Circle Reader Service Number 238

Zymacom Office System Out

WESTFORD, Mass. — Zymacom, Inc. has announced an office communications and messaging system that links telephones, personal computers and data processing equipment via existing private branch exchange telephone wiring. According to the vendor, because the Zymacom Information Exchange uses existing PBX telephone wires (two twisted pairs) to link telecommunications and computer equipment and requires no special cabling, the system's components can be moved to new locations.

The major functions of the system are messaging, file display and printing and the transfer among compatible personal computers via a central file server. Features include time and task management tools, electronic calendar and functions such as automatic speed dialing and callback. The system can also convert text messages to synthesized voice to deliver messages to users through their Touch-Tone-type telephones.

The Information Exchange system's major components include a

central server with Intel chip, 80286 processor, 1M-byte to 2M-byte memory, communications interface, 40M-byte expandable disk and 25M-byte cartridge tape backup; application software that runs on the central server for messaging, data sharing and task management; a desktop unit phone with video display and keyboard; speech synthesis unit; message lights; desktop voice/data unit that provides an interface to connect a standard phone and two RS-232 devices to the system network to allow simultaneous voice/data transmission at 9.6K bit/sec. data transfer rate via existing PBX wiring; and a message control console for a receptionist or message center.

Cost for a typical configuration of the Information Exchange system ranges from $40,000 to $70,000 for 60 to 120 users. The system can be configured for as many as 220 users. Leasing arrangements are also available. Contact Zymacom, Inc., 2 Liberty Way, Westford, Mass. 01886.
Circle Reader Service Number 239

HP Enhanced Laptop Debuts

PALO ALTO, Calif. — Hewlett-Packard Co. has unveiled an enhanced version of its Portable Plus, a 9-lb laptop computer. The enhanced Portable Plus features a new LCD, increased internal memory, new read-only memory (ROM) software applications and additional data communications capabilities.

According to the vendor, the new display has an improved contrast of more than 20.0% over the LCD of the previous Portable Plus. The computer will also be offered in both 256K-byte and 512K-byte random-access memory (RAM) models, and memory options will allow users to expand to as much as 1.2M bytes in the 512K-byte memory version. Newly available software on plug-in ROM cartridges includes Multimate International Corp.'s word processing software and HP's Executive Card Manager information management package. New data communications products, Reflection 1, Yterm and Sim 3278/PC, improve the ability to exchange information with HP and Digital Equipment Corp. minicomputers and/or with IBM and other mainframe computers, the vendor said.

The enhanced Portable Plus with 256K bytes of RAM is $2,695; the enhanced Portable Plus with 512K bytes of

Hewlett-Packard Co. Portable Plus

RAM is $3,395. In addition, plug-in RAM for either configuration has been reduced in price up to 39% and plug-in ROM application software ranges in price from $195 to $495. The warranty for the Portable Plus has been extended from 90 days to one year. For more information, contact Hewlett-Packard Co., 3000 Hanover St., Palo Alto, Calif. 94304.
Circle Reader Service Number 240

DG Workstations Feature Screen Saver

WESTBORO, Mass. — The Information Systems Division of Data General Corp. unveiled two new workstations. According to the vendor, the new workstations include a screen saver and soft setup menu. Designed to extend the life of the display by preventing image burn-in, the screen saver feature clears the display after a period of inactivity. The soft setup menu simplifies configuration by allowing variables such as terminal transmission speed, parity and mode of operation to be set by keyboard responses to menu prompts rather than DIP switches. The

company uses both Dasher D461 and Dasher 411 are targeted for business automation. WP and interactive data entry applications. Dasher D215 and Dasher D214 for interactive data applications.

Costs are Dasher D461, $1,495; Dasher D411, $1,195; Dasher D215, $895; and Dasher D214, $795. Dasher D400 and D200 series workstations are available 30 days after receipt of order. Contact Data General Corp. Information Systems Division, 4400 Computer Drive, Westboro, Mass. 01581.
Circle Reader Service Number 241

PRODUCTS

IBM Unveils Lap-Size Portable

BOCA RATON, Fla. — IBM recently unveiled its lap-size portable computer, the PC Convertible. Weighing less than 13 lb, the Convertible is battery powered and, depending upon diskette drive and printer use, can be operated in 10 to 10 hours by a typical user without recharging the battery pack, the vendor said. With an optional modem installed, the Convertible can communicate with other computers using existing telephone lines. In addition, the detachable display can be removed and replaced with optional IBM desktop displays.

The PC Convertible has an Intel Corp. 80C88 microprocessor and 256K bytes of user memory expandable to 512K bytes with the addition of 128K-byte memory cards. It features an 80-col. by 25-line LCD, a built-in inclined 78-key keyboard with full-size typing keys and dual 3½-in. diskette drives. Each diskette drive has a 720K-byte capacity. Also included are a battery pack and an AC adapter that can operate the system while simultaneously recharging the battery pack.

The IBM user price of the PC Convertible with 256K bytes of memory, dual 3½-in. diskette drives, removable LCD, 78-key keyboard, Application Selector and Systemapps diskette, AC adapter and battery pack is $1,995. Contact IBM, Entry Systems Division, P.O. Box 1328.

Seiko's Copiers

MILPITAS, Calif. — The Graphic Devices Systems Division of Seiko Instruments U.S.A., Inc. introduced the CH-5300 series of intelligent color copiers. The copiers produce A- and B-size images with up to 4,912 colors.

The CH-5301 is an A-size device with a print resolution of 152 dot/in. Print time per copy is less than 60 seconds on plain paper or transparency film. The CH-5312 can produce both A- and B-size images. Print time for a B-size image is less than 2 minutes, independent of plot densities. Print resolution is 203 dot/in.

Both units support a full range of video and parallel interfaces; the interfaces support 100 different terminals with no additional software required. Two versions of the video interface are available: CH-110 has 3.75M bits of both memory and accepts images with display resolution up to 1,280 by 1,024 pixels. CH-111, with 15M bits of memory, accepts images up to 2,560 by 2,048 pixels. Both video interfaces provide a full-frame buffer that stores the image during printing time, allowing multiple copies to be generated off-line without operator intervention.

According to the vendor, extensive user-selectable features are offered through local intelligence in the copier. Features include background removal; scaling of images by factors of two, four or eight; programmable aspect ratio correction by factors of 3.4 or 4.3; 90-degree image rotation for creating A-size output on the CH-5312; and monochrome printing capability. Model CH-5301 is priced from $5,995, and CH-5312 begins at $9,995. Copiers can be delivered within 90 days of date of order. Contact Seiko Instruments U.S.A., Inc., 1623 Buckeye Drive, Milpitas, Calif. 95035.

Circle Reader Service Number 243

Boca Raton, Fla. 33432.
Circle Reader Service Number 242

IBM PC Convertible

Dest Document Reader Gets Models

MILPITAS, Calif. — Dest Corp. announced four models of its Workless Station — a document reader for dedicated word processing and office automation systems. The new models incorporate type-style recognition programs and formatting capabilities previously available as options. According to the vendor, all of the new models can format text consistent with most major WP systems. A stack-feed feature allows 75 sheets of paper to be fed automatically into the systems. Also, the new products can be used for a number of applications including electronic filing, telecommunications and data conversion.

Model 235 can read a page of text in 25 seconds and comes with eight monospaced type-style recognition programs and a format processor board. Model 236 has four additional proportionally spaced type-style programs. Model 245 and Model 246 can read a page of text in 15 seconds. Model 246 also has the additional proportionally spaced type styles. Model 235 is $5,995; Model 236, $6,995; Model 245, $8,995; Model 246, $9,995. Contact Dest Corp., 1201 Cadillac Court, Milpitas, Calif. 95035.

Circle Reader Service Number 244

CALENDAR

May 14-16. Nashville — **Small Systems Conference.** Contact: Gartner Group Inc.; P.O. Box 10212, Stamford, Conn. 10212.

May 14-16. Chicago — **Network Protocols and Standards.** Also. July 7-9. Washington, D.C.; Contact Systems Technology Forum, Suite 150, 10201 Lee Highway, Fairfax, Va. 22030.

May 28-29. Boston — **Planning the Next Generation of Telecommunications Networks.** Also. Nov. 12-13, Vienna, Va. and Dec. 10-11, San Francisco. Contact: IDC Washington Division, Suite 240, 1500 Planning Research Drive, McLean, Va. 22102.

June 2-4. Toronto — **The IBM System/38: Standards and Practices.** Also. June 9-10, Los Angeles; June 16-17, Chicago; June 23-24, New York City. Contact: DGC, 14550 Preston Forest Ln. Dallas, Texas 75230.

June 2-4. New York — **Data Communications System Components.** Also. July 9-11, Washington, D.C.; Contact: Systems Technology Forum, Suite 150, 10201 Lee Highway, Fairfax, Va. 22030.

June 2-5. San Francisco — **Syntopican XIV.** Contact: AIISP. 1015 N. York Road, Willow Grove, Pa. 19090.

June 8-10. Stamford, Conn. — **AI in an IBM World.** Contact: New Science Associates, 48 Hunt Terr., Greenwich, Conn. 06831.

June 9-11. San Francisco — **Local-Area Networks.** Also July 23-25. Washington, D.C. Contact Systems Technology Forum, Suite 150, 10201 Lee Highway, Fairfax, Va. 22030.

June 16-18. New York — **The Business Strategy Conference and Exhibition.** Contact: Online International, Inc.; 989 Avenue of the Americas. New York, N.Y. 10018.

June 16-19. Las Vegas — **1986 National Computer Conference.** Contact: NCC '86. AFIPS, 1899 Preston White Drive. Reston, Va. 22091.

June 23-25. Washington, D.C. — **Network Operations and Management.** Contact: Systems Technology Forum, Suite 150, 10201 Lee Highway. Fairfax, Va. 22030.

June 25. New York — **System/38 Data Base Design.** Contact: DGC, 1450 Preston Forest Square. Dallas, Texas 75230.

July 9-11. New York — **Fourth Annual PC Expo.** Contact: PC Expo, 333 Sylvan Ave., N.J. 07632.

July 17. Chicago — **Micro-Computer '86.** Contact: German American Chamber of Commerce, 666 Fifth Ave., New York, N.Y. 10103.

October 7-9. Chicago — **First PC Expo.** Contact: PC Expo, 333 Sylvan Ave., Englewood Cliffs, N.J. 07632.

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